RAILROAD GAZETTE

FRIDAY, JANUARY 14.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

MEETINGS NEXT WEEK.—Master Car-Builders' Club in New York, Jan. 20. Connecticut River Co. at Springfield, Mass. Lehigh Valley in Philadelphia.

ELECTIONS.—Canadian Pacific, Lucius Tuttle, Passenger Traffic Manager.—Cleveland & Canton, Blood party re-elects old directors.—Columbus, Hocking Valley & Toledo elects an entire new board.—Denver & Rio Grande appoints R. F. Weitbrec Assistant to the President.—Fort Worth & New Orleans elect directors in Southern Pacific interest.—Kansas City, Memphis & Birmingham appoints R. H. Elliott Chief Engineer—Lake Shore & Michigan Southern, George C. Green, General Counsel.—Louisville, New Albany & Chicago, Ferdinand Hall Chief Engineer.—Philadelphia & Reading re-elects Austin Corbin President.—St. Paul, Minneapolis & Manitoba appoints Joseph Bookwalter Land Commissioner.—Wheeling & Lake Erie elects W. R. Woodford Assistant General Manager.

PERSONALS.—General Freight Agent Wm. Duncan declines offer from the Wabash.—Col. George D. Perkins re-elected Treasurer of Norwich & Worcester, at 98 years of age.—Dead: John Roach, shipbuilder and mechanical engineer.—John S. Newberry, of the Michigan Car Works, Detroit.—George W. Parsons, corporation lawyer, in New York.

EARNINGS.—December earnings reported by 40 roads, 32 showing increases and 8 decreases. For November 9 roads report gross and net earnings, 8 showing increase and 1 decrease in gross; 5 increase and 4 decrease in net earnings.

TRAFFIC.—Anthracite coal tonnage, year 1886, by weekly reports, 31,470,172 tons; eastern bituminous, 11,920,966; coke, 3,612,452 tons.—Cotton receipts for the week, interior markets, 70,263; seaports, 159,044 bales. Cotton in sight to Jan. 7 was 4,953,776 bales.—Meeting in Chicago last week adopted agreement to limit issue of passes.—In 1886 there arrived at New York 68,742 cabin and 300,918 steerage passengers in 906 steamers.—Globe Line to be dissolved April 1 next. Baltimore & Ohio has withdrawn.—Blast furnaces in blast Jan. 1 were 332, with 127,660 tons weekly capacity, against 273, of 97,051 tons capacity a year ago.

CHANGES AND EXTENSIONS.—Denver & Rio Grande will build branches to Glenwood Springs and Ouray, Col.—Duluth, South Shore & Atlantic surveys making progress.—Fort Worth & Rio Grande will begin tracklaying shortly.—Grand Trunk reported planning a Duluth connection.—Illinois Central begins work on approaches of Ohio River bridge at Cairo.—New Jersey Junction Road nearly completed.—Ohio River will extend road from Pt. Pleasant, W. Va., to Huntington.—Salem, Ste. Genevieve & Centralia will begin work at Salem, Ill.—Texas & Pacific discovers coal deposits near the line at Strawn, Tex.—West Ontario Pacific will begin work at Woodstock, Ont.—New track reported for 1887 so far, 5 miles only.

LEASES, SALES, ETC.—Dallas & Wichita to be sold to Gulf, Colorado & Santa Fe.—Fitchburg Railroad Co. buys Troy & Greenfield (Hoosac Tunnel) from the State of Massachusetts.—Lawrence road transferred to Ashtabula Co. by consolidation. Both leased to Pennsylvania Co.—Northern Pacific directors vote against joint lease of Oregon Railway & Navigation Co. lines.—Reported sale of St. Louis, Kansas City & Colorado to Jay Gould denied.

FORECLOSURES AND REORGANIZATIONS—Central Iowa Consolidated mortgage to be foreclosed.—Indiana, Bloomington & Western leased lines to be consolidated with the company.—In New York, Chicago & St. Louis case, the Lake Shore people suggest a compromise.

NEW COMPANIES ORGANIZED.—Bristol & Elizabethtown, at Bristol, Tenn.—Chicago, Fort Scott & Texas, at Fort Scott, Kan.—Louisiana, Arkansas & Missouri at Little Rock, Ark.—Mississippi Valley at Bowie, Ark.—Omaha Southern at Omaha, Neb.—St. Joseph Terminal Co. at St. Joseph, Mo.—Topeka & Southern at Topeka, Kan.—Vincennes & New Albany at Jasper, Ind.

REPORTS AND FINANCIAL.—Buffalo, New York & Philadelphia for 1886 shows increase of 9¼ per cent. gross and decrease of 8¼ net. Net earnings were $1,187,755 less than fixed charges.—Central, of New Jersey, for 1886 shows increase of 4 per cent. gross and 2 per cent. net. The net earnings were $156,294 less than fixed charges.—Central Pacific, 10 months to Oct. 31, earned $13,307,006 gross and $7,290,099 net; surplus over all charges, $1,560,555.—Cincinnati, Hamilton & Dayton offers to buy in certain outstanding bonds; also bonds and guaranteed stock of leased lines.—Illinois Central, for 1886, earned $12,500,400, a decrease of 1 per cent. Illinois lines increased 2.5 and Iowa 4.6 per cent.; Southern lines decreased 8 per cent.—Louisville, New Albany & Chicago for 1886 shows increase of 13½ per cent. gross and 86½ net. Surplus over fixed charges, $120,478.—New York Central & Hudson River shows large increase in traffic and improvement in rates in 1886.—Pittsburgh & Lake Erie for 1886 shows decrease of 11 per cent. gross and 5 net. Surplus over all charges, and 6 per cent. dividends, $78,337.—Richmond & Allegheny for 1886 shows increase of 1¼ per cent. gross and decrease of 14 per cent. net.

Car Shop Notes.

The Cleveland, Columbus Cincinnati & Indianapolis is about to give the Marks coupler a trial on an extended scale, 600 cars now building being fitted with the coupler. The first batch of these cars was delivered last week by the Litchfield Car Works.

The Marks coupler is being fitted on several cars on the Delaware & Hudson Canal Co.'s road.

The Lake Shore & Michigan Southern is letting a contract for 200 stock cars. It was originally intended to fit these cars with watering troughs and mangers, but these fittings will be omitted and the cars built in the usual manner. The cars will be fitted with the latest improved form of the Ames coupler, which is uncoupled entirely from below. The drawbar is stronger and is less liable to choke with ashes or snow, having no hole in the top. It is also more applicable to flat cars, as it does not interfere with the load. Two sets of draw springs are used with each coupler, and are placed side by side. Timbers bolted to the under side of the middle sills run back to the cross tie timbers and assist the draft timbers in buffing. This latest arrangement of the Ames has now been at work for several months and is said to give good satisfaction; 1,000 cars are now running on the Lake Shore equipped with the Ames coupler, and 1,000 more will be shortly equipped. All cars lately constructed for this road are made of 50,000 lbs. capacity.

The recent disasters at Rio and Republic have brought the danger of car stoves into very prominent notice, and it is to be hoped that other roads will follow the example just set by the Lake Shore and equip a train with the Emerson heater, already referred to in these columns as being used on the Connecticut River Railroad and other roads. The steam in this case will be wholly taken from the engine, and the system will in the first instance be tried on the Cuyahoga accommodation train.

MacVeagh on the Union Pacific Tariff on Steel.

Franklin MacVeagh, one of the government directors of the Union Pacific Railroad, in a letter addressed to a Chicago paper regarding the tariff enacted by the Union Pacific on steel rails, says:

"Whether or not it is fair to charge so much more beyond the Missouri than on this side of it, it is hardly fair to put the burden of such a long established tariff upon a newcomer into the pool like Mr. Adams. That a large difference is justifiable all agree, and just how much or how little the difference should be on a particular item on a very long list might well seem to Mr. Adams of less immediate importance than other matters pressing upon his attention. The steel rail men are such exemplary protectionists that it is a wonder they are willing to cry out against the 'Infant' steel mill at Pueblo and seek to crush it by lowering the protective tariff it has secured for itself. Are our steel men only in favor of protection for themselves? If so, why haven't they a fellow feeling for the Pueblo men? Why take the side of the Midland road, demanding that it shall buy rails where it can buy cheaper than in Pueblo—to wit, in Chicago, where they won't allow the Midland to buy where it can buy the cheapest—to wit, in England? And why demand that the Midland shall build its tracks cheaper than the Denver & Rio Grande track, when they profess to believe in high-priced tracks? And why appeal to the National Government, as is threatened, to destroy the trade of the Pueblo 'Infant?' What could the National Government do in such a case, unless find a distinction between Colorado silver miners, and Colorado coal and iron miners? I for one am glad to have the question agitated, for if the steel men succeed in breaking the tariff it will be broken for us all, and I am by no means sure that it would not even be better for the railroads to have it broken. I am pained to hear our infant industries crying out against one another. I fear we shall be forced in the end to think that, like Tennyson's infant, Mr. Adams' assailants have no language but a cry."

Why Do Angle Bars Break?

[A pader read before the Club of Engineers of Maintenance of Way, South-Western System, Pennsylvania Railroad, by J. A. Weiss, C. E.]

Experience shows that the life of an angle-bar is unfavorably affected by:

1. Heavy traffic and engines.
2. Great speed.
3. Close joints.
4. Position on outside of rail joint.

The first two conditions either multiply or intensify the stresses.

The close joints aggravate the condition that destroys the bars beyond what the calculations would seem to justify.

The position on the outside of the joint is the one most favorable, practically if not theoretically, to the exertion of the stresses.

There seems to be no reason why, in a joint tightly screwed up, the outside bar should break rather than the inside one; but in practice the joints are more or less loose a good part of the time, and the intimate contact between rail and bar necessary for the full effect of the load does not obtain. If the joint is but slightly loose the lateral pressure of the wheel flanges crowds the rail to close contact with the outside bar, while the inside one is comparatively disengaged. The outside bar is thus not only more frequently strained, but has alone to resist a stress intended for both.

I venture to say the great disparity between the breakage of bars on different sides of the joint indicates less than ordinary care in keeping the nuts tight; also that there are more pairs of bars broken in track where the joints are kept standard than when, under approximately similar conditions, the joints receive less care. The deflection of the rail ends due to the load is so slight that the contact between rail and bar must be very close for the bar to be influenced at all.

The effect of close joints, that is, small expansion room, observed by some of us as facilitating the breakage, is explained by conceiving the angle bar to be a beam of the depth of the rail with a notch or nick in the centre (where the moment of the loss is greatest) to a depth equal to the height of the rail head, and of a width equal to the expansion room. Such beams break more readily than those of a cross-section uniformly equal to that at the notch, because the elongation of the extreme fibre is, in the notched beam, measurably limited to the width of the notch, whereas in the beam of uniform cross section it extends over the whole surface. If the analogy is sound (it will hold only when the nuts are tight) it follows that the smaller the expansion space (the more acute nick) the more readily will the bar yield.

In an able paper on this text laid before our club by one of its members occurred a suggestion bearing on this particular point, which had already been put by him to limited trial, of planing off ⅛ in. of the top surface of the bar for say 2 in. on each side of the centre. The result was at first favorable, but the weakening the bar underwent was found afterward to overbalance the advantage of increased expansion surface.

Tension, compression and shear are the more prominent stresses on the bars, but the *prima facie* cause of the breaking of nearly all bars is the first, produced by upward flexure at the joint. This flexure is mostly due to the load in the field between the joint tie and tie next to it, bending the rail there downward and throwing the free end of the rail up. It is also likely that the recoil of the rail ends, after the passage of the load, produces an appreciable stress. This rise and fall of the joint has very aptly been called a "rocking motion," and the remarks above are, perhaps, but an amplification of this expression. I mention it, however, as inferentially disposing of the assumption in the calculations of the rail being a girder with fixed ends.

When the load is in the field next to the joint, the stress in the latter falls altogether on the bars, while when the load is over the joint, the rail ends engage more than half of it. Away from the joint the rail should be taken as a continuous girder on numerous supports, and the moments and deflections due to the loads figured accordingly. Moreover, on account of the yielding substance of the ties the clear space between them ought not to be taken as the length between supports, but more properly the distance from centre to centre.

The rocking and pitching of the engine, the sinking of the ties in the ballast, strong side winds and great speed, each increases the moments and deflections.

The distance from centre to centre of ties, taking 16 of 8 in. face each to a 30-ft. rail, is 22½ in. The moment of a wheel load of 20,000 lbs. is 78,750 lbs. (.175 × 22.5 × 20000). The safe load of our 60-lb. standard steel rail would be 74,600 lbs. at the elastic limit $\left(\frac{14.23 \times 45000}{.175 \times 22.5 \times 2.18}\right)$; 14.23 being I, and 2.18 the distance to enter fibre. The deflection of the rail under a centre load of 20,000 lbs. is 0.0054 in. $\left(\frac{20000 \times \overline{22.5}^3}{108\ E\ I}\right)$; $E = 27{,}000{,}000$.

Speed appreciably increases the effect of the load. According to a formula of Mr. Phillips, used by some European authors, speeds of 40, 50 and 60 miles per hour increase the moments to respectively 1.263, 1.40 and 1.585 times that of a dead load. The deflections are likely increased in the same ratio by speed.

The strength at the joint seems only to be exactly determinable by experiment. It will vary with the wheel base as changing the condition of the rail from a continuous girder to one, approximately, with fixed ends. To become the latter the wheel base of our consolidation engine would have to be nearly five times smaller than it is. The great difficulty is to determine the degree of continuity furnished by the bar. We have ocular proof by "low joints" of the impairment of this continuity. The rail there evidently distributes the weights differently from what it does near the centre. Assuming the continuity to be perfect, however, the moment of the load over the joint is the same as in the central fields, 78,750 lbs. The resistance of both rail ends at elastic limit we will assume to be one-half of that were the rail continuous throughout, or 37,300 lbs. The strength of the bar of P. R. R. pattern of 1886 would be, for iron 8,800 lbs., and for steel 16,000 lbs., assuming the neutral axis to be horizontal. If the neutral axis be assumed inclined, the strength figures within 200 lbs. of the above—in both cases the bar is considered as with fixed ends. The entire strength of the joint would according figure, if of steel, 68,900 lbs., against 74,600 lbs. for the continuous rail. The safety factor of 3¾ in the central fields becomes 3.4 at the joints, and shrinks to 2.7, 2.4 and 2.2 at speeds of 40, 50 and 60 miles per hour respectively, and may become less under a conjunction of circumstances.

The joint deflections are still more in doubt than the strength and less subject to figures. In Europe they were once measured in a case where the distance between the joint ties was but 0.8 of that between the others. The splices were fish bars of a pattern curiously like the web part of the P. R. R. pattern of 1886. The deflections were found to be about the same as those in the central fields.

The curve of flexure of a bar under a vertical load is naturally convex downward, while that of the rail with the load at its free end is convex upward. The resulting lines, as I have observed in bars removed from the track, form two sides of a plane triangle with the apex under the joint. The influence of this distortion of the normal curves on the strains in the bar must be an interesting inquiry.

The burr on the bar is, I think, partly due to this difference in the trend of the curves. If the bar is but slightly loose the rail end will strike it only at one point—the middle—and eventually produce the burr.

In metals strained in opposite directions it has been satisfactorily shown that the algebraic differences of these strains are to be taken as the measure of rupture. In a piston rod the safe co-efficient would be 5,000 lbs., where 10,000 would be the one were it strained in only one direction

We have already seen the safety factor at the joint shrink under certain conditions to 2.2 with loads straining it in but one direction. If then the bars are also strained in the opposite one we may infer that this factor is none too high.

The opinion of most engineers who have given the matter thought seems to lean toward a stronger bar, and if we admit that that joint is most perfect which approaches the strength of the continuous rail we at once become of the same opinion. In this view the bar of Pennsylvania Railroad pattern of 1886 is a great improvement on the older ones.

Prof. Spangenberg, supplementing Woehler, showed that for an increase of strength in an arithmetical ratio the number of strains necessary for rupture increases in a geometrical ratio. We can, therefore, predict a comparatively longer life for the bar of 1886 than its increase of cross-section or weight would indicate. The wear of the angle-bars on the Louisville bridge is a converse confirmation, I think, of Prof. Spangenburg. The traffic and some of the engines over the bridge are very heavy, but since 1878 but 148 single bars of the primitive pattern have been broken, of which, by the way, 56 were on the inside and 92 on the outside. This is less than nine pairs per mile per year. The bars, though absolutely weaker than those generally in the track, are relatively stronger because of the closer spacing of the ties, 16 in. centre to centre, the reduced speed and the even bearing of the ties on the stringers.

All these bars were broken as usual from the top down, and the rupture must have been due to tension, because the joints are "supported," not suspended. Most of the bars showed a slight burr at the joint. The disproportionate increase of wear to strength can be turned to account by supplanting the weak patterns in main lines by that of 1886 and applying the former to the branch lines or sidings, where, under changed conditions, they will last indefinitely. Of 2,000 pairs of the P. H. No. 1 pattern put on the Cambridge Branch of the J., M. & I. R. R. not one was broken, nor a bar on the 50-lb. iron rail laid in 1882 on the Madison Branch of that railroad. On the other hand, on the main line there were

counted broken in April 5,498 bars, of which 3,728 were on the outside and 1,770 on the inside.

Should the pattern of 1886 not prove satisfactory, I would propose for an outside bar, which is practically the weaker, one with an angle grafted on at the top 2¼ in. long on each side of the centre and projecting one inch. The elongation of the top fibre, instead of being as now virtually limited to the expansion space, would be distributed over 4½ in.; the nick feature would be removed and top and bottom placed more on an equality. There may be some practical difficulties about rolling this bar, but I think they can be surmounted. The proposed bar has a sectional area of 3 sq. in. at the centre, against 2.62 sq. in. for the 1886 pattern. It would weigh less than 1 lb. more.

Assuming the neutral axis to be horizontal, the distance from it to the top fibre is 1.56 in., and from the bottom fibre 1.65 in., against 1.75 in. and 1.46 in. respectively in the bar of 1886—a decid d advantage in the former.

The moment of inertia of the proposed bar is 2.81, against 2.03 for the 1886 bar. The strength at the elastic limit would compare at nearly 23,400 lbs. against 15,800; and the strength at the joint at 76,500, against 68,900. The inconvenience of differing outside from inside bars is perhaps rather imaginary. Till recently we have had them, each pair being composed of one with oval and one with round bolt-holes. The bar is easily dist nguished from its mate, so that little time is lost in selection.

By trial I found that the proposed bar can be fastened with the ordinary wrench.

When steel was first laid on the Cincinnati Southern the ties, 2,640 to a mile, were spaced in a manner unusual in this country, however, common in the old. The joint ties were put but 6 to 8 in. apart. It is to be regretted that no record was kept of the behavior of the bars with this spacing, which was subsequently abandoned. The consulting engineer mentions a curious fact, that more bars are broken under approximately similar conditions of traffic on the 60-lb. steel with 28-lb. bars than in the 53-lb. steel wich 22-lb. bar.

Large Radial Drill.

The large tool which we illustrate, manufactured by the the Universal Radial Drill Company, of Cincinnati, O., is a recent design which furnishes one of the most powerful tools of the kind ever built, as need hardly be said. The first one was furnished for the Brooklyn navy yard. The tool differs from the similar machines of smaller size built by the same firm in having a quarter circle—fan shaped—base and outside pillar, the base being of unusual size to accommodate very large work. The outside pillar is moved by a pinion engaging in the circular rack on the periphery of the base, and can be bolted rigidly to the arm and base for extraordinary work, or entirely removed to admit work, otherwise too large, to get under the spindle. The arm has a bearing 32 in. in length around the column, and a deep strengthening web on top, in order to make it very rigid under working strains. The spindle frame is moved along the arm by means of the crank at the left of the feed worm-wheel, thus enabling the operative to stand immediately at the spindle while bringing it to the desired point. The machine will drill or bore a number of holes parallel with each other—vertically downward—anywhere within he range of the arm, and as the spindle is geared with unusual power, has a quick return and is counterbalanced, it is well adapted for heavy boring.

The column which carries the arm, driving gear, frame, etc., is bored and fitted over a stationary stump, bolted fast to the sole-plate. The stump has sufficient length of bearing to prevent the column from swaying, and is provided with an adjustable pivot, bearing upon an elastic diaphragm in the column, which, when the bolts in the flange at the lower end of the column are slackened, takes the weight of the machine off the flange bearing and allows the column, with the arm, etc., to revolve easily through the entire arc. For ordinary drilling the bolts in the flange need not be tightened, but when extraordinary rigidity is required a partial turn of the wrench will bind the column fast to the sole-plate. The sleeve which carries the arm and gear frame is fitted snugly to the column and may be raised and lowered by power. It is provided with clamping bolts. The table has both horizontal and vertical faces, and is provided with planed T slots.

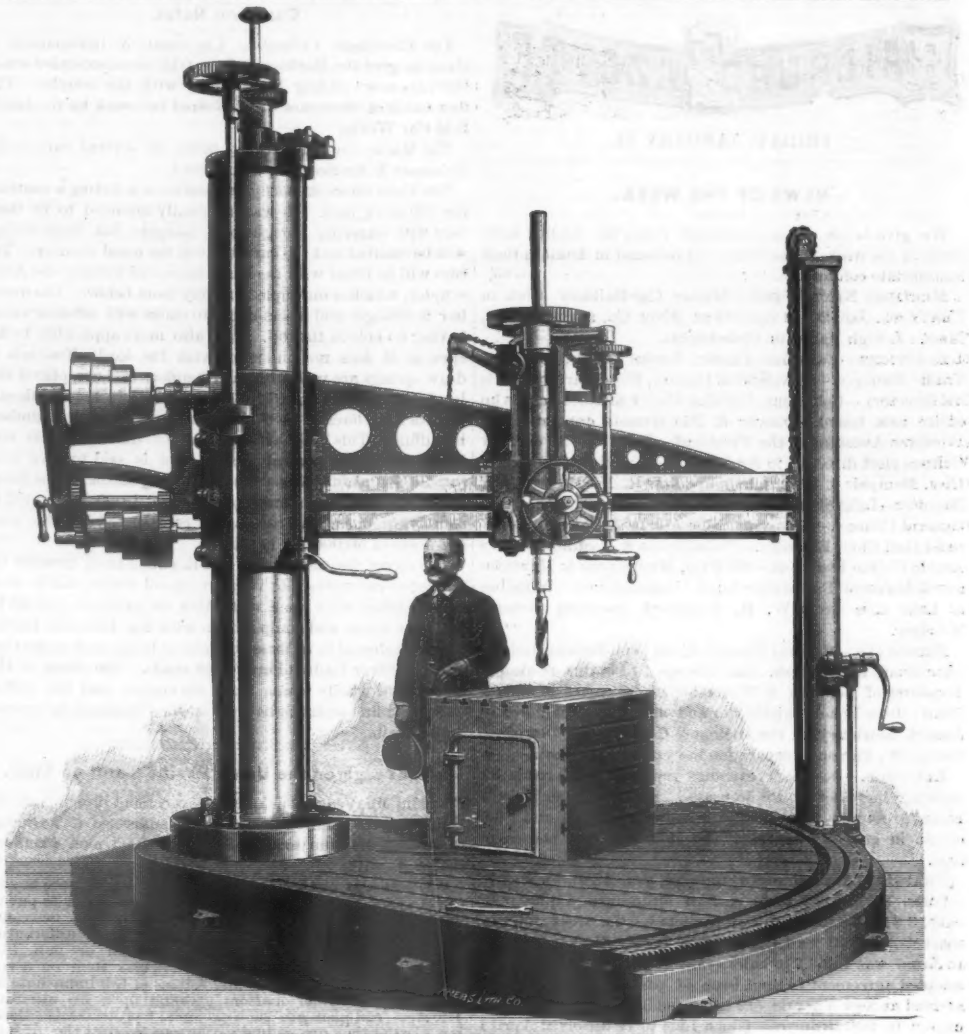
The counter-shaft consists of a frame with a horizontal shaft and T and L pulleys, and a pair of cut mitre gears to connect with the vertical shaft at the centre of the top of the column.

The spindle, feed screw, elevating screw and all shafts are made of machinery steel, and the feed worm is made of hardened tool steel. All thrust bearings are provided with phosphor-bronze washers. Every machine is provided with heavy back gear and power feed.

The leading dimensions of the machine are:

Column	9 ft. 6 in. × 15 in.	Size of table	28 × 28 in.
Radius of arm	8 ft.	Floor space for base	10 ft. 6 in. × 12 ft 3 in.
Height within counter-shaft	11 ft. 5 in.	Column to centre of spindle	6 ft.
Height, including shaft*	18 ft.	do. with outside column removed	6 ft. 10 in.
Height of table from base	25 in.	Weight, about	15,000 lbs.

*To allow for the difference in height of ceilings, a shaft 8 ft. long is furnished with key seat whole length to connect from counter-shaft to driving wheel on top of column. This will accommodate any ceiling to 15 ft. in height.



LARGE UNIVERSAL RADIAL DRILL

Made by the UNIVERSAL RADIAL DRILL COMPANY, *Cincinnati, O.*

Contributions.

Car Mileage and Repairs—Mr. Spalding's Explanations.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I perused with considerable interest the article by "N" which appeared in your issue of Dec. 31, and am much pleased with some of his conclusions. He certainly seems to appreciate the importance of this subject and the necessity for reform. He requests certain explanations, and in asking some questions he follows them by the correct answers. In cases it will be unnecessary for me to reply.

Below I will endeavor to make explanations requested in regular order:

1st. "N" asks:

"I should like to ask for some explanations as to certain items in Table II.—I notice Mr. Spalding gives carpenters' labor $5.65, but makes no mention of cost of drilling and machining the iron work. A serious omission is that of general expenses, including foremen's, draftsmen's, time-keepers' and clerk's wages, repairs of buildings, machinery, tools, etc., etc. These generally amount to fully 15 per cent. of the cost of bare wages and material as given by Mr. Spalding."

In order to cover cost of drilling and machining the iron work, etc., a sufficient per cent. was added to cost of material, and in computing amount of labor expended we added 10 per cent. to amount of wages actually paid to cover general expenses, which would include wages to foreman, clerks and repairs to buildings, machinery, tools, etc.

2d. "N" says:

"I notice that there is some discrepancy between the itemized cost of box cars.

	Table 9.	Table 11.
Cost of body	$200.00	$210.35
Cost of trucks	315.00	296.50
	$515.00	$506.85

"Perhaps Mr. Spalding will explain the cause of this difference. It will be noticed that the *relative* cost of trucks and body varies more than the total amount. Does this imply that one set of cars had swing motion trucks while the others were rigid?"

These tables are for two separate and distinct cars which were built at different times and different shops. They differ in trucks as he suggests. As "N." correctly answers other points raised it will be unnecessary for me to refer to them. My ambition in this matter has been to call the attention of the railroad public to the importance of car mileage and repairs and endeavor to make some suggestions in the direction of improvement and advancement in car service and I wish here to express my gratitude to the GAZETTE for aid which they have extended me in this cause.

E. C. SPALDING,
Car Accountant Western & Atlantic R. R. Co.

Reply to Mr. Becker on Rail Joints.

TRENTON, N. J., Jan. 3, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Replying to the communication from Mr. Becker in a late issue, anything from him on the question of rail joints deserves and will always receive careful and appreciative attention. In fact, he was the first among the distinguished railroad engineers of the country who called attention to the startling facts of the angle bar's failures, quite unconscious then of the personal annoyances to follow, which he afterward humorously described in a letter published in your journal. I can only say I regret that the "new heavy bar" of Mr. Mansfield's experiments was not the "No. 4," as I supposed. I am confident the results would have been the same though perhaps less marked. Undoubtedly an angle bar can be made heavy enough not to break. But it becomes inefficient, long before it breaks, by its rapid and unequal *wearing* at the centre and consequent ceasing to fit and support the rail end. However strongly proportioned, it has still only the narrow bearing under the rail head to carry the load in every condition of percussion and friction. Were the head as wide as its base the rail might be supported there *almost* as well as by the base itself—but not otherwise. It is not the breaking of angle bars that adds so much to the cost of maintenance of good surface as it is their effect when worn and unbroken, to bring about "low joints," loosened joint ties, extra motive power to haul over these depressions and the large item of rolling stock repairs resulting therefrom.

It seems to me that the answer to the following simple question is conclusive as to whether the fish or angle-bar system is "all bad" or not, viz: Would any engineer propose using such a method for securing by splicing the ends of iron girders in a bridge or roof, with two plates, of whatever strength touching only along their edges between the two flanges of the I-beams—not even in contact with the web—and *secured* there by four ¾-inch bolts or rivets in holes of *one inch* diameter? Yet one hears people—and engineers—seriously claiming that with such a contrivance, essentially such beams or rails laid in track and exposed to treatment that finally ends in their destruction can be made approximately as strong at the joint as elsewhere, *and kept so!*

Have they ever ascertained what the angle bar joint and rail ends held in place by these four little ¾-inch bolts will carry under the testing machine, after three or four years of mutual wearing? If Mr. Becker will have that test made I believe he will then decide that the angle-bar system *is* bad, even though made strong enough not to break.

CLARK FISHER.

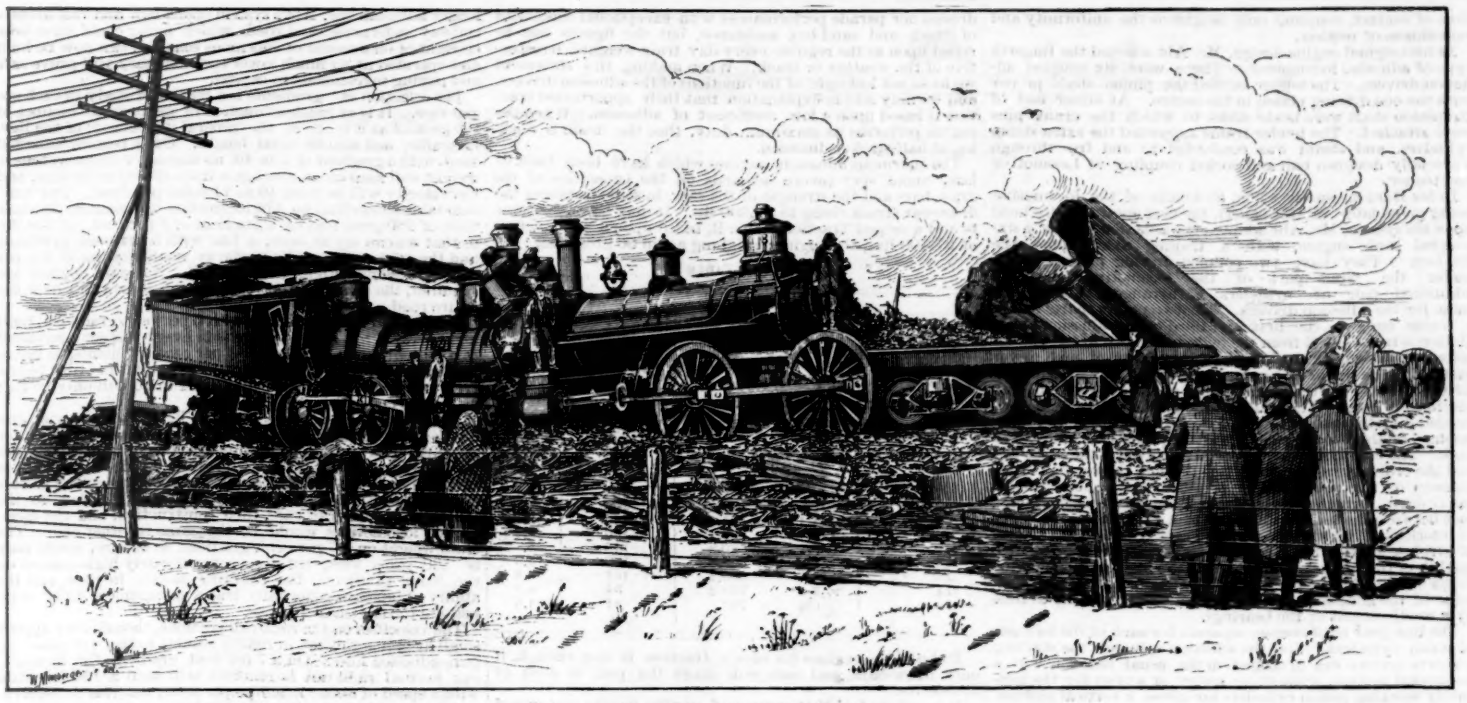
A Pass Swindler.

New York City & Northern Railroad Company,
MASTER OF TRANSPORTATION'S OFFICE,
HIGH BRIDGE, N. Y. CITY, Jan. 11, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Not knowing to what further extent this fraud has been perpetrated, and in protection to others, I submit the following correspondence, which explains itself:

[The correspondence referred to shows that in September last one John C. Fowler presented to Mr. R. E. Ricker, General Superintendent of the Denver & Rio Grande Railroad, a forged letter introducing himself as "formerly Construction Engineer and late Superintendent of this road" from Mr. M. W. Maguire, Master of Transportation of the New York City & Northern Railroad. Upon this Fowler obtained a quarterly pass which he transferred to others to travel upon until it was taken up by one of the conductors from a "Mr. Graham."]



THE REPUBLIC COLLISION.

The entire transaction is a most villainous forgery. The letter head and stamp are evidently of his own design, being totally dissimilar to those in use here. It shows a painstaking rascality worthy of a complete publication, and I have furnished all railway papers particulars in protection to others.

I am informed that some 7 years since, during the early construction of this road, this Fowler was employed here with an engine and two cars in the capacity of conductor, from which I presume he has usurped the titles he plumed himself with. Respectively yours,

M. W. MAGUIRE, Master of Transportation.

Mt. Desert Rackrail Railroad.

ROCKLAND, Me., Jan. 1, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the list of rack-rail roads in your last issue, I see no notice of the "Green Mountain R. R." (Mt. Desert, Me.); built in 1883, 6,000 feet long; max. grade, 1 in 3; Warren Nickerson (of Orrington, Me.), Chief Engineer.

Supposing the list was intended to be complete, I take the liberty to call your attention to the omission.

O. H. TRIPP.

The Republic Collision.

We present on this page a view of the engines that collided at Republic, O., Jan. 4. The photograph from which the engraving was made had some defects that the engraver could not remedy, but the salient points are faithfully shown. The picture gives no light on the "rearing in the air like living monsters," which the newspapers reported. The fire had evidently consumed all the woodwork of the passenger engine's tender and of the cars behind it before the view was taken.

The Abt System of Railway for Steep Incline.

[A paper read before the American Society of Civil Engineers by Walton W. Evans, C. E.]

(CONTINUED FROM PAGE 6).

But the component bars of Abt's rack-rail are not only laid with broken joints, they are also, if the expression be permitted, laid with broken pitches—that is, the teeth of the side-by-side bars are arranged in the form of steps, as shown in fig. 7, which is a beautiful feature of Abt's rail. It enables the simultaneous contact of several teeth of the pinion with different bars of the rack-rail, thus giving a contact and a smoothness of motion that could never be obtained with the ladder type. This interlocking of several teeth offers at the same time an increased security against the fracture of a tooth, and even if, from some external cause, such an event should occur, it could not be followed by any serious consequences. In discussing the defects of the ladder-rack, we have seen that for the very reason of getting just sufficient contact, the pinion had to be made of a certain size, and with that size multiple gearing became unavoidable. Through the stepping of the teeth, however, Abt's pinion can be made so much smaller in diameter, without interfering with a still superior contact, that multiple gearing is entirely unnecessary, and is dispensed with. The ensuing simplicity and efficiency of the locomotive is not the least of the many excellent points of Abt's system.

The pinion (shown in detail in fig. 6 and applied to the locomotive in fig. 8) is constructed of as many separate disks as there are separate bars in the rack-rail, each disk corresponding to a line of bars, and the disks are shifted against each other according to the stepping of the teeth in the bars. Another very important feature in the construction of the pinion, is that its various disks are in an elastic connection with the shafts by means of inserted springs. By this arrangement the different disks obtain a small, limited, relative motion to each other. We had occasion to point out the sources of error which would lead to imperfections in the manufacture of the ladder-rack; the manufacture of Abt's rail, on the contrary, admits at every step of the application of tools which secure accurate work. Yet whatever remains of slight inaccuricies, be it in manufacture, be it due to the mode of fastening on the ordinary ties, or be it due to expansion by temperature, they are most cleverly counteracted by an elastic connection of the pinion disks with the shaft; and an absolutely perfect, automatic contact of the teeth is established, with the pinion traction uniformly distributed over the various bars of the rack-rail. Practical experience has fully borne out the high expectations that were entertained in the conception of this system. Even at 16 miles per hour a motion is obtained on rack-rail sections which is perfectly smooth and free from any blows or irregularities. Not the slightest noise is to be observed, the pinion working as silently in the rack as the regular adhesion drivers on the ordinary rails.

A characteristic property of Abt's rack-rail consists in its economic accommodation to the gradients of the road. The numbers or the thickness of the individual bars of which the rack-rail is composed, are chosen according to the traction to be sustained; number or thickness of the bars, therefore, increase and decrease with the gradient. Such an accommodation is impossible with the ladder-type for obvious reasons.

Then, again, curves of any radius can be laid with ease, because the same bars are used as on the straight portions of the line. The ladder-rack, on the contrary, has to be made on purpose, with great care, and for each radius separately.

On the Mount Washington, Rigi and several others of the earlier railroads, the rack-rail rests on wooden stringers, which in turn are fastened to the ties. With the introduction of the mixed, or combined adhesion and rack-rail systems, it became necessary to give to the rack-rail a sufficiently elevated position relative to the ordinary rails, so that the pinion could clear the latter safely at switches and crossings. Iron chairs were now introduced for support. The free position of the rack-rail obtained in this manner is an excellent safeguard against accumulations of snow and mud. With Mr. Abt's system this advantage exists in a higher measure, on account of the narrow bars of the rack-rail and the comparatively wide clearances between them. These clearances form a kind of furrow, which admit of a mechanical clearing, or, we might say, plowing, by a device on the locomotive itself. As mountain regions will particularly be the haunts of rack and pinion, and mountain regions generally have heavier snow-falls, it will be of interest to cite the experience of the existing lines. Ostermundingen and Rorschach-Heiden, in Switzerland, and Wasseralfingen-Friedrichsberg, in Germany, are all three operated summer and winter, and at all these places severe winters are prevalent. The lines were constructed respectively in 1870, 1874 and 1876; they were opened to traffic in the years immediately succeeding, and have been regularly operated ever since. Yet in all this time trains have run on these lines in the heaviest snow-storms, and not a single train has ever been stopped on account of snow or snow-drifts. The rack-rail locomotive is provided with a sort of snow-plow, and the positive action of the pinion always pulls it through. The Fourth Annual Report of the Rorschach-Heiden road says: "The extremely heavy snowfalls of last year not only did not influence the regular operations of the line, but we had no expense whatever for removing the snow. Experience shows that a heavy snow is far less obstructing to a rack railroad than to an adhesion line; no matter how large the accumulated masses are, with a rack railroad they are of no account." Practice has demonstrated that the rack locomotive can pass snow-drifts which the adhesion locomotive could not overcome. The rack-rail on the above lines belongs of course to the ladder-type, but no difficulties with snow having appeared there after so many years of constant service, none will exist with the superior Abt rail-rack.

Crossings and switches are made and operated with rack railroads similar to those on pure adhesion lines, and in every respect they are as simple and as safe. The first switches were constructed in the form of sliding-tables and turn-tables, as, for instance, on the Mount Washington, and immediately afterwards on the Rigi Railway, but they soon were built in close adherence to the customary adhesion devices. (See fig. 9.)

The peculiar method by which, on a line of the combined system, the change is made from the adhesion portions to the rack-rail without stopping the train, will be described after having discussed Abt's locomotives.

ABT'S LOCOMOTIVES (fig. 8.)

The rack-rail enables us to adopt steeper gradients in the development of our railroads; we can follow more closely the natural slopes and shorten our line. But by combining with the steeper gradients the easier ones of the pure adhesion system, we expand the usefulness of the rack-rail enormously, provided we are also capable of building locomotives which, under all the varying conditions of grade, can invariably exert their full power. This means that traction and corresponding speed must vary in inverse proportion: large traction with low speed, small traction with high speed. If we simply take a line with a maximum gradient of 6 per cent., and with other gradients ranging all the way down to level, the condition of a full exhaustion of the engine's power in every part of the line demands a most extraordinary capacity of accommodation. On adhesion portions an adhesion engine will do the work, and will do it well if properly dimensioned, but once those gradients are transgressed which practical experience has designated as a limit to an economical adhesion service, the locomotive necessarily must fail, not only on account of lack of traction, but also, and which is equally important, on account of lack of purchase for the steam. Weight, that recourse of regular locomotive practice, together with increased cylinder volume, does not offer any satisfactory solution, for while it slightly improves the climbing qualities, it introduces drawbacks in its stead by which the benefit derived has to be dearly paid for all over the line. With the rack and pinion, on the other hand, weight is practically immaterial for their working. We could therefore take any type of adhesion locomotive which, with comparative moderate weight, has been approved of for practical adhesion gradients, and by adding the pinion mechanism as an independent and separate part throughout—with an independent set of steam cylinders—we could add exactly those qualities which are indispensable in the mounting of the steeper gradients. This is precisely what Mr. Abt has done in designing his locomotives. Adhesion drivers work separately and independently from the pinion device; they work alone on the pure adhesion portions of the line, and they quietly keep on working when rack-rail sections are encountered. Rack and pinion then supply the additional traction, and the extra steam cylinders secure the necessary purchase for the steam. The speed adjusts itself according to the total traction and the steaming qualities of the boiler, and the engine develops its full powers under the most varying and trying of circumstances.

To the exhausts of the ordinary adhesion cylinders are added, when ascending rack-rail portions of the line, the more numerous exhausts of the pinion cylinders. This produces an energetic and uniform blast, and secures a free and abundant steaming at the very time it is most needed.

Another important reason for utilizing the natural adhesion of the locomotive, exists in the fact that, even on gradients of 600 and more feet to the mile, and with trains of a still practical size, the traction due to adhesion alone will be from ⅓ to ¼ of the total traction. The rack-rail can thus be relieved of a corresponding amount of strain, and can be made lighter and cheaper. A certain engine weight we shall always have, for weight and the capacity of performing work are, to a certain extent, parallel terms in locomotive construction, and this necessary weight can be excellently made use of in relieving the strain on the rack.

The characteristic feature, then, of Abt's locomotives, consists in the additional mechanism with which any well approved or favored type of adhesion engine is equipped, and thus is transformed into a locomotive for a rack-railroad. Through Mr. Abt's ingenious rack-rail construction, which admits a pinion of small diameter, multiple gearing, as we stated previously, has become superfluous. The pinion shaft is driven directly from the separate pair of cylinders, and the construction of the rack-rail locomotive is reduced to a simple form.

The vast superiority of the independent adhesion drivers and pinion over their combination by direct coupling, as has been done on some of the modern rack lines, is evident. A rigid coupling of the two mechanisms presupposes an ever-constant relationship between the pitch-line diameter of the pinion and the diameter of the adhesion drivers, a condition of things which practically it is impossible to maintain. Important frictional losses are unavoidable with such a design; then, besides, there being only one pair of cylinders—unless there should be a special second train of wheel-work—the engine lacks that capacity of economical accommodation which forms such an important feature of Abt's locomotive. In this engine of his, the separation of the adhesion and the pinion device is so absolutely perfect that neither one can disturb the other. Whether on account of the condition of the track the adhesion drivers slide or not, whether they be running ahead or behind, all this has not the slightest influence on the pinion, which steadily does its part.

It is true that on the engines of the Madison & Indianapolis Railroad the pinion was driven by independent steam cylinder's, but Abt's engine is otherwise entirely different in construction. Then, again, Abt's whole railway system is essentially grounded upon his rack-rail, and his engine is the logical sequence of the latter.

Through Abt's rack-rail it has become possible to build rack-rail locomotives of special large traction, *by simply coupling two or more driving pinions.* All the objections which existed with the ladder-rack against the coupling of pinions as a means to increase tractive power, are completely overcome in Abt's rack-rail type. With its continuity, its perfect and equalized pitch, and the elasticity in the pinion disks, coupling has not only become practicable, but by placing one pinion a little in advance of the other in reference to

time of contact, coupling only heightens the uniformity and smoothness of motion.

In his original engine design, Mr. Abt selected the Engerth type of adhesion locomotive. There were six coupled adhesion drivers. The tender carried the pinion shaft proper with the one driving pinion in the centre. At either end of the pinion shaft were brake disks, to which the crank pins were attached. The tender frame supported the extra steam cylinders, and steam was conducted to and fro through a specially designed ball and socket coupling of locomotive and tender.

In his Harz locomotives (fig. 8; details of the locomotive being given later in this paper), the first ones actually built upon his system, Mr. Abt adopted the adhesion type of a six-coupled tank engine, with a trailing axle behind the fire-box. They have two coupled driving pinions placed under the front part of the locomotive, and the additional pair of cylinders is arranged above the those for the adhesion drivers. The two pinion shafts rest in a frame hung to the first and third of the adhesion axles. Motion is transmitted from the cylinders above to the pinions below by means of rockers, in a very compact and clever manner. The size of the cylinders is small, as the piston velocity, by reason of the small pinions and the interjacent connections, is large. The frame of the pinion shafts, being suspended directly to the adhesion axles without any intervening springs, establishes the proper relative position of pinion and rack. The constant relative position between the rack-rail and the ordinary rails is preserved through the regular maintenance of the line, which experience has demonstrated is easily done. Another protection against any incorrect contact between the teeth, on account of a variation in the depth of interlocking between pinion and rack, exists in the system of involute gearing itself. This system possesses the valuable quality of the contact remaining always correct, though the depth of interlocking may undergo variations. The natural wear of the adhesion tires is compensated from time to time by a readjustment of the bearings.

The link gear is, of course, separate for each of the two sets of steam cylinders. For the adhesion cylinders the starting levers or screws are arranged in the usual manner, with a horizontal motion, while these levers or screws for the incidently working pinion cylinders are given a vertical motion; thus well discriminating between the two.

The braking arrangements are very efficient. There is first an ordinary brake for the adhesion drivers; then there are brake disks on the crank shaft of the pinion mechanism, by means of which the pinions may be completely locked; and thirdly, there is an auxiliary loose pinion, with brake disks, on the trailing axle of the locomotive. The last one serves merely for the purpose of stopping the train in case of any accident to the driving pinions or their gear. The braking on down gradients is done by using the steam cylinders as air-compressors, there being special provisions for this purpose. This is the most perfect brake imaginable, and it is used on every one of the existing rack-railroads. In regular service all down-hill braking is entirely done by the driving pinions of the locomotive, and whatever braking pinions in the train are being called upon—one or more cars being provided with such. Wherever, therefore, the rack-rail is laid, the wear and tear of braking is taken off from the rails and tires without proportionately diminishing the lives of rack-rail and pinion, because the sliding and rolling of the teeth in contact occurs on smooth and well-greased surfaces. The work of braking is chiefly spent here in the compression of air in the steam cylinders, while with the usual braking device, *i. e.*, brake shoes pressing against the wheels, it is busily engaged in the demolition of rails, tires and shoes.

Mr. Abt, when designing the normal type of his engines, which were to run on lines connecting directly with existing adhesion railways and using the regular rolling stock, had to limit the net tractive power to the working capacities of the draw-bars and the buffers in use. The normal draw-bar of the European lines possesses a working pull of 14,300 to 15,400 lbs., while the normal buffers admit a working compression from 16,500 to 17,600 lbs. Mr. Abt, in order to get as powerful an engine as possible, chose the latter figure of 17,600 lbs., and the locomotive when exerting the maximum net traction has its place at the rear of the train, and pushes it ahead. Besides an increased safety in the operation of lines with heavy gradients, there are still other reasons, which we will touch further on, why the engine is preferably placed to the rear.

The 17,600 lbs. then represent the net traction of the locomotive; whatever traction is necessary to move the engine itself has to be added in order to obtain the gross traction; that is, the combined effort of pinion and adhesion drivers. It is evident that for lines with special rolling stock, or with cars having extra strong draw-bars, locomotives of far greater tractive power can be built.

The conditions for a powerful locomotive of this class are more favorable in our country, because the draw-bars are substantially stronger. Our draw-bars are capable of standing a safe working pull or push of at least 21,200 lbs., and we may adopt this figure for the present as the net traction of the normal American types of Abt's engines. These engines will weigh 50 gross tons. The following traction table gives the net train weights in gross tons, exclusive of locomotive, which these engines will haul on the various gradients; it also gives the corresponding speeds in miles per hour.

TRACTION TABLE A.

GRADIENTS.			TRAIN WEIGHT. Ex. engine.	SPEED.
Per cent.	Ratio per unit of rise.	Feet per mile.	Gross tons.	Miles per hour.
3.	1 in 33⅓	158.4	290	8 6
3.5	1 " 28.6	184.8	250	8 4
4.	1 " 25.	211.2	222	8.2
5.	1 " 20.	264.	180	7.8
6.	1 " 16⅔	316.8	152	7.5
7.	1 " 14.3	369.6	130	7.2
8.	1 " 12.5	422.4	115	6.9
9.	1 " 11.1	475.2	102	6.6
10.	1 " 10.	528.	92	6.4
11.	1 " 9.1	580.8	84	6.2
12.	1 " 8⅓	633.6	77	6.
13.	1 " 7.7	686.4	71	5.8
14.	1 " 7.1	739.2	66	5.7
15.	1 " 6⅔	792.	62	5.5

On pure adhesion sections the speed of these engines may be run up to 30 and 35 miles per hour, while on rack-rail sections of lighter gradients a velocity of 12 miles per hour can safely be maintained in regular service. And such a speed we may need even on rack-rail sections if the system is to answer all the possible requirements of a regular traffic in passengers and merchandise.

When comparing our traction table with existing tests of adhesion engines, it is to be remembered that the table is based upon a net pull or push at the draw-bar of 21,200 lbs. Any larger admissible draw-bar strain will enable us to build our engines with proportionately greater traction, so that they will haul heavier trains. Another point worthy of being considered is, that our table does not present holiday dresses nor parade performances with exceptional conditions of track and sand-box assistance, but the figures can be relied upon as the regular every-day train-weights, irrespective of the weather or track. When making this statement we have not lost sight of the functions of the adhesion drivers, and we may add in explanation that their apportioned traction is based upon a low coefficient of adhesion. When the engine performs its maximum duty, then the steam is working at half-stroke admission.

The enormous adhesion engines which have been built of late, make very severe demands on the capacities of the draw-bars and the strength of the cars, in some instances the draw-bar strain rising to 27,500 lbs. It may be instructive to add a second Traction Table B, based upon a net traction of 27,500 lbs., the engines weighing again 50 gross tons:

TRACTION TABLE B.

GRADIENTS.			TRAIN WEIGHT.	SPEED.
Per cent.	Ratio per unit of rise.	Feet per mile.	Gross tons.	Miles per hour.
3.	1 in 33⅓	158.4	4'0	6.4
3.5	1 " 28.6	184.8	355	6.3
4.	1 " 25.	211.2	314	6.2
5.	1 " 20.	264.	254	6.
6.	1 " 16⅔	316.8	213	5.8
7.	1 " 14.3	369.6	184	5.7
8.	1 " 12.5	422.4	162	5.5
9.	1 " 11.1	475.2	144	5.4
10.	1 " 10.	528.	130	5.2
11.	1 " 9.1	580.8	119	5.
12.	1 " 8⅓	633.6	109	4.9
13.	1 " 7.7	686.4	101	4.8
14.	1 " 7.1	739.2	94	4.7
15.	1 " 6⅔	792.	87	4.6

To build the engines for such a traction is easy enough, if only draw-bars and cars will stand the pull or push of 27,500 lbs.

It is self-evident that engines of smaller weight and power can be constructed to suit any requirements of traffic. For roads of light traffic and smaller trains, a special engine has been designed by Mr. Abt, with only one pair of steam cylinders for both adhesion drivers and pinion. In this case, of course, only one device can work at the same time. This locomotive resembles, in its action, the engines on some of the existing rack-railroads of the combined system, but the whole construction is by far simpler and better.

A very important question relates to engine repairs. Experience has taught that, even with the complicated engines with multiple gearing, the repairs are perfectly normal, and can be compared favorably to those of regular adhesion locomotives when doing the same amount of work.

AUTOMATIC ENTERING RAIL. (See fig. 10.)

On a line of the combined system it is of the greatest moment that the rack-rail be properly entered by the pinion without slackening the speed of the train, especially if the line happens to consist of a great many alternating sections. Mr. Abt accomplishes this by laying down a special entering rack-rail. This entering rail, of about 10 ft. in length, is hinged upon the end which joins the continuation of the rack, and its other free end rests upon strong spiral spring. The teeth toward the free end gradually diminish in height, giving that end a wedge-shaped appearance when looking at it from the side. When the locomotive passes over the entering rail, steam is not yet admitted to the extra pair of cylinders, so that the pinion upon touching the yielding entering rail, and on account of the friction produced thereby, can turn about its axis, and within a few feet of distance traveled over, a true interlocking of the teeth is reached. Should the friction between the pinion and the entering rail be too small to produce a rotation of the pinion, then the latter will slide along the entering rail, and after a few inches of sliding the proper contact is secured. The very simplicity of this apparatus is the best guarantee of the absolute certainty of its automatic operation. It never has failed, and it works without any blows or noise.

When reflecting upon the working of the locomotive al along the line, apprehensions might be felt at first glance on account of the apparent complexity of the parts, and there being but one driver to take care of and manipulate the whole. But it must be considered first, that the locomotive is almost invariably placed in the rear of the train, and, secondly, that the various manipulations come about at different times and never simultaneously. With regard to the first point, one of the most trying and exhausting of the duties of the driver on a regular adhesion locomotive consists in the watching of the line with all its flying pictures, crossings curves, signals, etc., and particularly so when the train is a fast express. His attention is divided between engine and line, and the greater part is absorbed by the latter. With the engine at the rear of the train, the line is watched by the brakeman on the front car, and the driver, thus greatly relieved, has mainly to care for his engine. On the adhesion portions of the line he has nothing but the adhesion parts to look after. When approaching a rack-rail section the speed of the train is moderate, the entering rail being passed at a speed of 5 to 6 miles per hour, and he has ample time to watch the correct entering of the pinion before he gives steam to the extra set of cylinders. His adhesion engine needs no attention whatever at that moment, but is working steadily along. On down-hill gradients again all he has to care for are his brakes. There is only one thing to do at a time and plenty of time to do it well.

Having described the essential features of Abt's rack-rail and engines, it remains yet to say something of the practical applications of his system.

APPLICATIONS OF THE SYSTEM.

After pointing out at some length how and why the location of railroads in mountainous districts has ever been one of the most difficult tasks of the engineer, Mr. Evans continues:

The lower the gradient to which the engineer is limited, the longer will be the line, the greater the call for artificial structures, the deeper the cuts, the higher and costlier the embankments, the more numerous the bridges, and the longer and more frequent the tunnels. Any system which admits an expansion of the limit of gradients will greatly reduce the cost of construction of new roads, but a system like that of Mr. Abt, which combines at once an extensive range of gradients with perfect safety and economy of operation, will prove a perfect boom, one of the most valuable gifts to our modern means of transportation. Through Abt's railway system we can adhere more closely to the bottom of the valleys; in fact we can take the ground much in the shape it is in. All our construction expenses in excavation of earth and rock and in masonry per mile of road will be smaller, the road itself will be materially shorter, and it will take much less time to build it and have it in operation. So great are the savings from all these sources, that, even including the extra expenses for rack-rail and engines, the cost per mile of the shorter Abt railway will never reach the cost per mile of the longer adhesion line. Abt's system opens new and vast fields to railway enterprise; and roads which never could have been thought of on account of enormous expense, can now be built and operated at so much lower cost that they will prove safe and paying investments to capital.

The selection of gradients is a matter of study in each special case. It is as much a function of the natural inclines of the ground as it is one of the general importance of the line, its traffic, and also its total length. On a regular adhesion road, with a gradient of 1 in 40, an engine of 48 gross tons in weight will haul on an average a train of 180 gross tons, and the velocity will be from 10 to 14 miles per hour. Our traction table shows that an Abt locomotive can manage the same train of 180 gross tons on a gradient of 5 per cent., or 1 in 20, so that we can say at once, a line with 5 per cent. gradients and the rack-rail handles traffic as readily as one of 2½ per cent. gradients without the rack-rail. No extra engines are required, the same locomotives pull the same train over the entire road.

A principal line, therefore, with 5 per cent. gradients, built and operated by Abt's system, is in every respect equivalent to a regular adhesion line of 2½ per cent. gradients, as far as the handling of the traffic is concerned. But in order to rise from one level into another a line of 1 in 20 will only be half as long as one of 1 in 40.

According to the lengths of the lighter and heavier gradients on a given line, it can be demonstrated that even for principal railways a maximum gradient from 6 to 7 per cent., 317 and 370 feet to the mile may be adopted, and, as a rule, the same traffic be economically managed which is now handled by adhesion lines of 2½ per cent., of 132 feet to the mile. The number of cars, their construction, and the number of locomotives would be the same in either case. The train weight on a 7 per cent. gradient, to be sure, would only be 130 gross tons, but the proportionately higher speed on the lesser gradients, the resulting saving in time, and the ability of increasing the daily trains in number, fully compensate for the smaller trains.

The velocities on the rack-rail portions, though they appear small at first sight, are in reality similar to the velocities on pure adhesion lines. On a 7 per cent. gradient, for instance, our normal rack-rail locomotive will haul a 130-ton train with a speed of about 7.2 miles per hour, but this is equivalent to a speed of over 20 miles per hour on a gradient of 2½ per cent.

A very important point in favor of this new system when compared with the mountain lines of usual gradients, is the materially increased safety in the working of the line. The hold of the pinion is absolute and positive, the adhesion is only utilized to what the average conditions of the track will warrant, and the facilities for braking are abundant and superior. Then again, the facility with which the trains can pass from adhesion sections to rack-rail sections, admits of arranging stations, depot-yards and switches on horizontal ground, and upon the pure adhesion system. Where desirable, rack-rail switches may be used on gradients, and can be operated with perfect safety.

The general operating expenses are lower with Abt's railway system than with the equivalent adhesion system. The rack-rail sections are considerably shorter than would be the adhesion sections which they replace, and there is correspondingly less maintenance and supervision of the line. There is, then, the additional rack-rail. The life of the rack-rail can be assumed from present experience to be 40 years with a very severe traffic passing over it. Calculating its renewal upon such a basis, and adding the cost of maintenance and ordinary care, which latter expenses are also drawn from the long experience with the unfavorable older form of the ladder-rack, we still get a considerable balance in favor of the rack-rail portions. The consumption of fuel, the expense of firing up, and the losses through stoppages at the stations are the same with either system. But the consumption on the open line is in favor of Abt. The work of lifting train and engine from one level to another one is, of course, identical in either case: with Abt, however, the higher level is reached by a much shorter route, and the frictional losses, which are in direct proportion to the length of the line, are therefore smaller, and require less fuel to be overcome. It may be claimed that the application of a pinion and rack introduces frictional losses which are wholly unknown to the adhesion system. This claim holds good as far as the friction of the teeth is concerned, but when considering and calculating the frictional losses of the adhesion drivers in curves—and curves preponderate in mountain districts and hilly sections - and when further considering the losses which are due to the unequal wear of the tires, which happen all along the line, it will be found that the pinion is still a more efficient worker than the ordinary adhesion driver.

With principal or main lines we have thus far spoken only of the application of 7 per cent. gradients; yet circumstances may even here carry us far higher. If the chief ascent, for instance, occurs at a relatively short section on the line only, we may follow similar examples in the working of adhesion lines, and employ an auxiliary engine. With one engine pulling, and the other one pushing the train, we can carry the same load of 180 gross tons which is hauled of a 2½ per cent. gradient, up an incline of 1 in 10, or 528 feet to the mile. This is certainly doing remarkably well.

In fact two engines are capable of hauling a train of 124 gross tons, or six loaded cars of about 46,000 pounds each, on a gradient of 15 per cent., or 792 feet to the mile = 1 in 6⅔.

Existing railways with gradients of 150 feet per mile and upward will be highly benefited by laying a rack-rail on such gradients. This is an extremely simple matter which requires but very little time. The existing engines can either be rebuilt, or they can be replaced by new ones. The adoption of the rack-rail on such old lines resolves itself into an increased regularity and safety in the operation of the roads, an essentially increased capacity for hauling freight, and sensibly reduced working expenses. It may be stated in a general way that one locomotive of Abt can be made to do the service of two or three adhesion engines. In view of the heavy gradients on many lines of the American continent it is well to call attention to these things.

With a smaller traffic we make use of smaller engines, and with these latter we can introduce a relatively larger traction, *i. e.*, be able to haul relatively heavier trains. Our traction table relates to what we termed normal types, weighing in complete working order 50 gross tons. In reference to small-sized locomotives, we may mention that an Abt engine is now in course of construction which is to work on a network of narrow-gauge tracks in slate quarries in Bavaria, Germany, and which in complete working order will only weigh 4½ gross tons. We shall speak of that line further on.

Local roads, and especially private lines to factories, quarries, mines, etc., are almost prohibited in hilly or mountainous districts by reason of their first great cost. Economy can only be maintained in a substantial manner by following closely the undulations of the ground, and this is precisely what Abt's system, with its enormous range of gradients, permits us to do.

A very advantageous and extensive application of the rack-rail will be found in connecting factories, mills, etc., with a neighboring railway station, when either above or below its level. Railroad cars can then be run to and fro in the easiest and cheapest manner on a short rack-railway—a simple truck takes the place of a locomotive, and it is operated by either hand or steam power.

DETAILS OF THE ABT RACK RAIL SYSTEM.

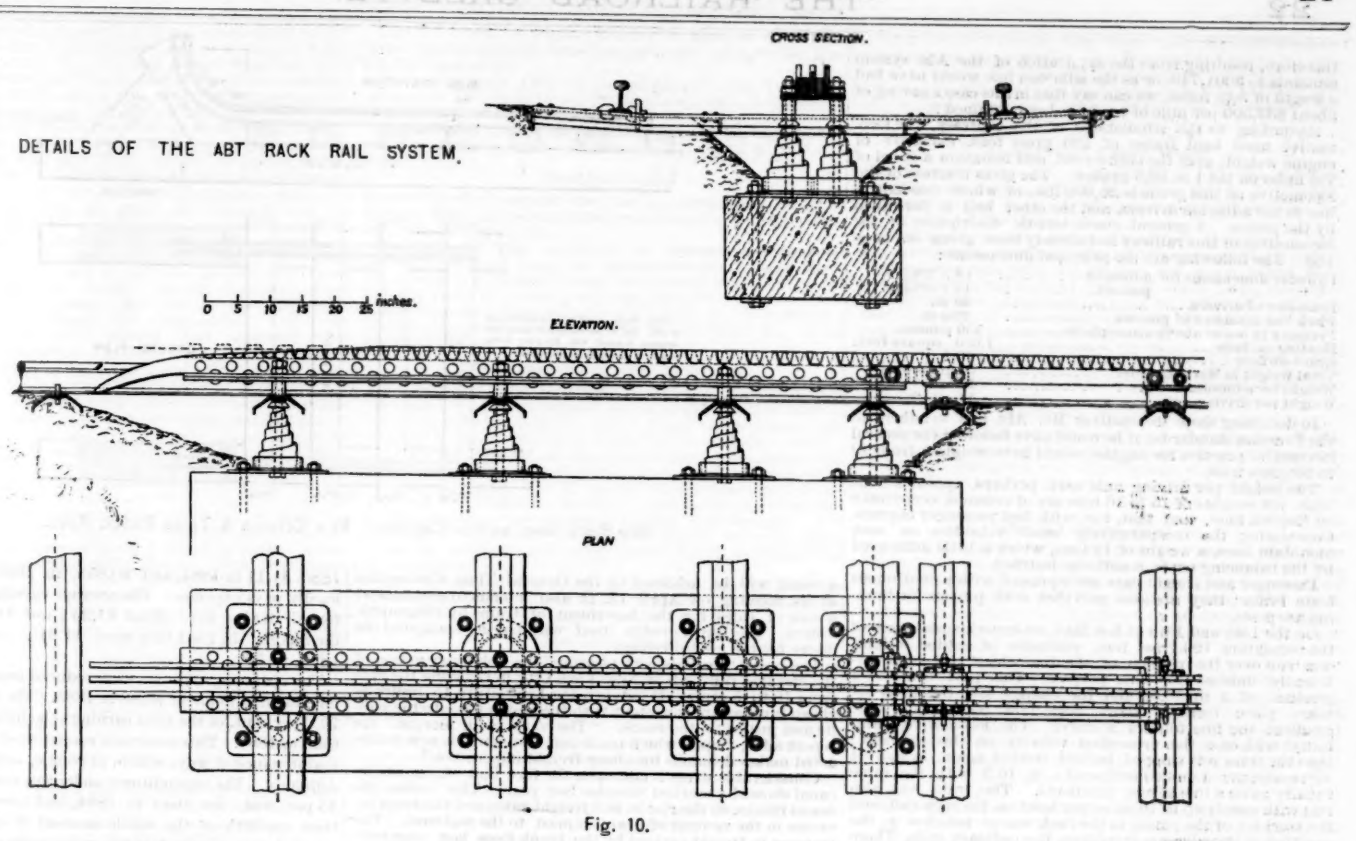


Fig. 10.

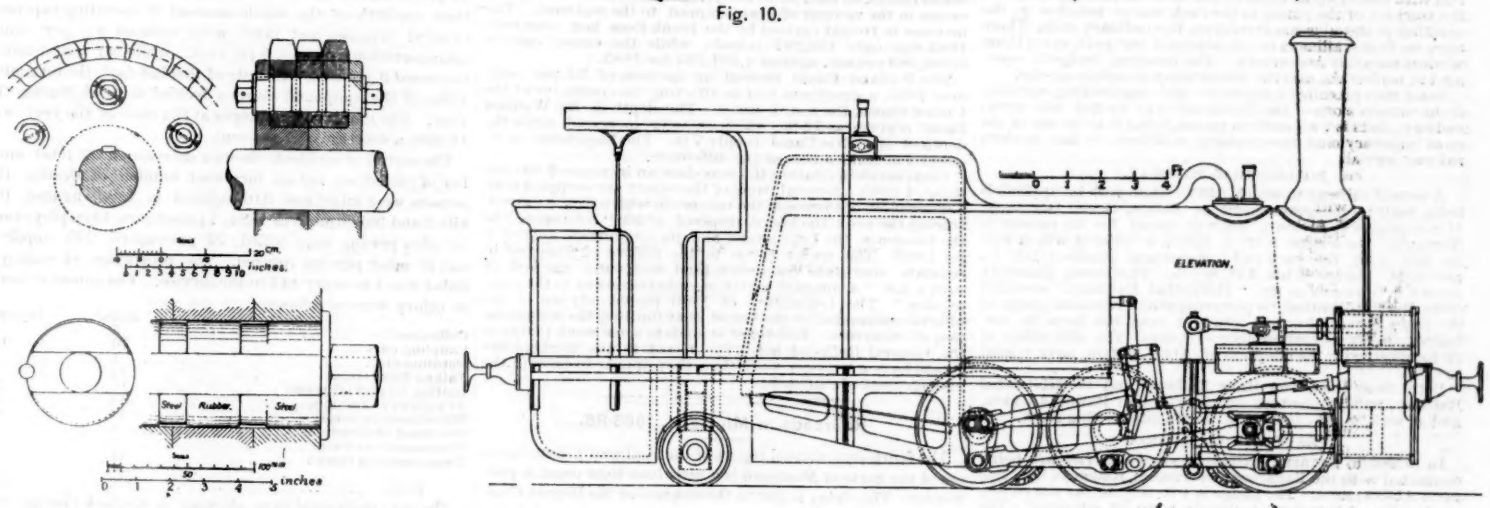
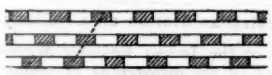


Fig. 6.



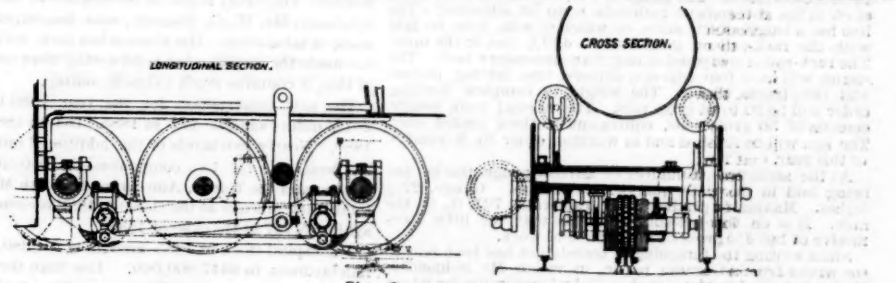


Fig. 8.

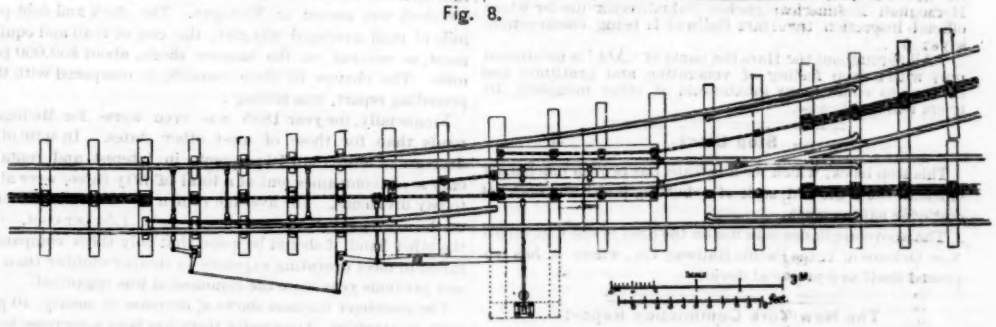


Fig. 9.

THE HARZ RAILWAY* (Figs. 1 and 2).

The "Harz" is the collective term for a massive group of elevations belonging to that last chain of mountains beyond which extend the comparatively low lands and plains of northern Germany. Its medium elevation is about 2,000 feet, and politically it is situated in the commonwealths of Brunswick and Prussia. Valleys, in the usual sense of the term, there are none to speak of; they partake more of the nature of romantic ravines or gorges with very precipitous slopes. The district contains many valuable mines and quarries, and it abounds in rich woodlands and abundant water power for industrial purposes. Nevertheless the traffic of this region is not large enough nor will it ever be, to warrant the expense of an ordinary adhesion railway of 1 in 40, or even 1 in 35. Most careful statistical researches of the annual traffic were made, but things looked hopeless enough until Abt's system offered a satisfactory financial solution. The difficulties in locating an adhesion line were greatly aggravated by the fact that the line had to touch the greatest possible number of the scattered industrial settlements, irrespective of the most favorable route from an engineering point of view. All these difficulties disappeared with the freedom Abt's system admits as to gradients.

The line which is just now in the course of construction, and one-half of which will be opened to traffic this autumn, is not quite 17 miles long, and 3.55 miles of this length are provided with the rack-rail. The maximum gradient for the adhesion sections is 2½ per cent. (132 ft. per mile), and all steeper gradients are provided with the rack-rail. The maximum gradient of the latter is 1 in 16.5, or 320 feet to the mile. The line contains but very few straight sections, and forms in reality a succession of curves. This, in conjunction with the range of gradients, demonstrates forcibly the adaptability of this railway system to the exigencies of the ground. Along the open line the curves have a minimum radius of 665 ft. (8 deg. 45 min.) and in the village of Rubeland there is one of 590 ft. (9 deg. 44 min.) The rack-rail is laid with three elementary bars. Gauge of track, 4 ft. 8½ in. The total estimated cost of this line of 17 miles is $875,000, or about $51,500 per mile.

Extensive field studies and estimates were made in order to establish the difference in cost of construction between a line with pure adhesion gradients and one combined with the rack-rail. These estimates were made for the first 6.7 miles, 3.22 miles of which are laid in 8 different divisions with the rack-rail. These investigations include the minutest details, were carried through with the utmost care, and give the following results, showing the great economical value of the Abt system:

	Abt system.	Adhesion system.
Length	6.7 miles	9.32 miles
Real estate required	1,280,000 sq. ft.	1,780,000 sq. ft.
Excavation (earth and rock)	330,000 cu. yds.	1,120,000 cu. yds.
Masonry (retaining walls, etc.)	5,640 "	33,900 "

The amounts are especially striking in the items of excavation and masonry, the former being about 3½ times and the latter about 6 times larger for the pure adhesion line than for the Abt system. Real estate runs in proportion to the length of the line.

Estimating at the rates there existing, and considering only those construction accounts which differ with the two systems, we find:

	Abt system.	Adhesion.
I.—Acquisition of real estate	$11,875	$16,500
II.—Earthwork, rock, etc.	113,825	308,668
" Retaining walls	16,125	97,125
III.—Crossings	20,424	38,845
VI.—Bridges and culverts	2,704	5,414
X.—Superstructure, rails, tier, etc	97,504	97,500
XI.—Signals and telegraphs	405	562
	$262,862	$564,611

All other construction expenses, as for instance, for depot buildings, etc., are alike for both systems. The total saving,

*In the description of this first actual application of the Abt system, we follow mainly a very able paper (see Glaser's Annalen für Gewerbe und Bauwesen, 1883) by A. Schneider, C. E., Herzoglich Braunschweigischer Bahndirector, who has made all the preliminary studies, and under whose immediate care the road is being built.

therefore, resulting from the application of the Abt system amounts to $301,749, or as the adhesion line would have had a length of 9 32/100 miles, we can say that in this case a saving of about $32,500 per mile of road has been obtained!

According to the stipulations of the contract, the locomotive must haul trains of 120 gross tons, exclusive of engine weight, over the entire road, and maintain a speed of 7½ miles on the 1 in 16.5 grades. The gross traction of the locomotive on this grade is 26,000 lbs., of which one-half is due to the adhesion drivers, and the other half is furnished by the pinion. A general characteristic description of the locomotives of this railway has already been given on page 169. The following are the principal dimensions:

Cylinder dimensions for adhesion	18 × 23½ in.
" " " pinions	12 × 23½ in.
Diameter of drivers	49 in.
Pitch line diameter of pinions	23½ in
Pressure in boiler above atmosphere	150 pounds.
Heating surface	1,610 square feet.
Grate surface	19.4 " "
Total weight in working order	54 gross tons
Weight on adhesion drivers	42 "
Weight per driving axle	14 "

In designing these locomotives Mr. Abt had to adhere to the Prussian standards; if he could have followed the general locomotive practice the engines would have weighed from 49 to 50 gross tons.

The weight per driving axle may, perhaps, appear a little high, yet weights of 15 to 16 tons are of common occurrence on English lines, and that, too, with fast passenger engines. Considering the comparatively small velocities on such mountain lines, a weight of 14 tons, which is little influenced by the balancing parts, is entirely justified.

Passenger and freight cars are equipped with a continuous train brake; they are also provided with pinions for braking purposes.

On the 15th and 16th of last May, an experimental train of the regulation 120 gross tons, exclusive of engine weight, was run over the portion of the line which had been sufficiently finished for this purpose. This part contains a gradient of 1 in 16.5, and the change into this gradient takes place from a short horizontal section; on the gradient the line follows a curve. The locomotive maintained with ease the prescribed velocity on this gradient; then the train was stopped, backed, started again, in short it was manœuvred on this incline of 1 in 16.5 with the same facility as on a line of easy gradients. The train was also run with speeds up to 16 miles per hour on the rack-rail, and the working of the pinion in the rack was as noiseless as the working of the adhesion drivers on the ordinary rails. There were no blows, tremors or vibrations in any part, everything worked smoothly and evenly. The entering rack-rail operated to perfection, and the whole was a complete success.

Since then prominent engineers and engineering societies from various parts of the Continent have visited this novel railway, and they all unite in pronouncing it to be one of the most important and far-reaching additions to our modern railway service.

HOELLENTHAL RAILWAY.

A second railway to which Abt's system will be applied is being built by the government of Baden, South Germany, It commences at Freiburg and will extend for the present to Neustadt. Its length is 21¾ miles, 4 miles of which will be laid with the rack-rail; maximum gradient 290 ft. per mile. Gauge of line 4 ft. 8½ in. This road, generally known in Germany as the "Höllenthal Railway," so called from the "Höllenthal," a picturesque and romantic gorge of the Black Forest, through which it runs, has been in contemplation for a great number of years. The difficulties of its location, with the adoption of Abt's system, have ceased to exist.

Both these lines, the Harz Railway and the Höllenthal Railway, will be members of the German Railroad Union, and as such, will be open to all continental rolling stock.

RAILWAYS IN BAVARIA.

In Lehesten, Bavaria, extensive slate quarries are being connected with the Bavarian Government Railways by a line upon Abt's system. The gauge is 4 ft. 8½ in., as the rolling stock of the government railroads is to be admitted. The line has a length of 2¾ miles, of which ¾ mile is to be laid with the rack-rail on gradients of 422 1/10 feet to the mile. The rack-rail is composed of only two elementary bars. The engine will have four adhesion drivers, two driving pinions and two truck wheels. The weight in complete working order will be 20 to 21 gross tons. The normal train weight consists of 50 gross tons, equivalent to three loaded cars. The line will be finished and in working order by November of this year.

At the same time, a number of narrow-gauge tracks are being laid in the slate quarries themselves. Gauge, 27½ inches. Maximum gradients for rack-rail, 721 ft. to the mile. It is on this network of tracks that the little locomotive of but 4½ gross tons will have to work.

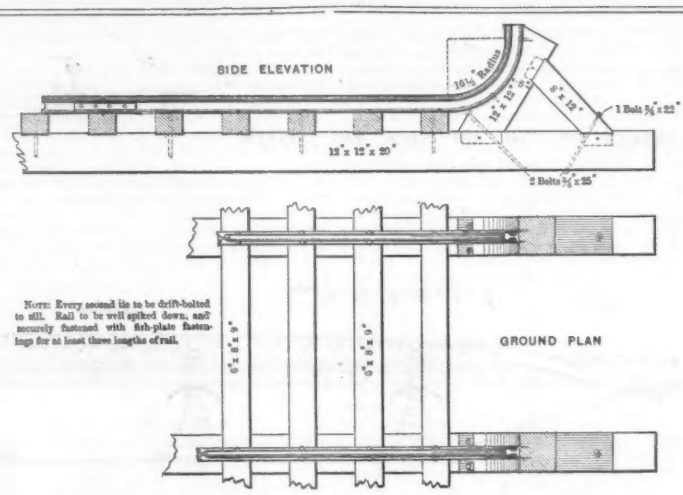
Since writing the foregoing, a translation has been sent to the writer from a German paper, in which Mr. Schneider, Herzoglich Braunschweigischer Bahndirector (under whose official inspection the Harz Railway is being constructed), says:

"All throughout the Harz the name of 'Abt' is mentioned only with a deep feeling of veneration and gratitude, and for time to come many inhabitants of other mountain districts will do likewise."

Stop Block.

This stop block, which we illustrate, has proven much more efficient than the old style of "butting post," and does not cost over half as much.

The above appliance is in use on the lines of the Cincinnati New Orleans & Texas Pacific Railway Co., where it has approved itself as a practical device.


SIDE ELEVATION
16½" Radius
13" x 12" x 20"
1 Bolt ¾" x 22"
2 Bolts ¾" x 25"
Note: Every second tie to be drift-bolted to sill. Rail to be well spiked down, and securely fastened with fish-plate fastenings for at least three lengths of rail.
GROUND PLAN

Stop-Block used on the Cincinnati, New Orleans & Texas Pacific Road.

The New York Commission Report.

According to the fourth annual report of the New York Board of Railroad Commissioners for the fiscal year which ended on Sept. 30, 1886, last year was fairly profitable for the railroads of the state. The depression seemed to have reached low-water mark at the close of the previous fiscal year. The tide turned in the autumn of 1885 and steadily rose. The improvement is credited largely to the formation of the trunk line traffic agreement and to the lease of West Shore by the New York Central & Hudson River Co. The physical condition of the railroads shows a marked improvement over 1885. Of this the board is certain, as its inspection of railroads and bridges is constant and sharp. There are 3,500 bridges in the state, and the attention of railroad managers is called to the fact that train loads are sometimes heavier than bridges are expected to bear, though they may be able to bear more than the strain for which they have been tested.

The board's efforts to secure better car ventilation have not been successful. The ignorance and indifference manifested on this subject it characterizes as astonishing. The report advises the adoption of uniformity of rules and signals in the operation of state roads. Some hope is entertained that such a result will be achieved by the General Time Convention at its meeting on April 13. It also intends to recommend a code of rules for the movement of trains by telegraphic orders. The board credits itself with having instigated the desire for the needed reform.

The board "records with pleasure" the voluntary action of the elevated railroads of New York City in reducing the fare from 10 to 5 cents. It advises the Legislature to insure as cheap fares as are consistent with the best service to the public and justice to the roads. "The very small margin," the report adds, "upon which trade and commerce is now transacted makes demands for cheap freight imperative."

Considerable stress is laid upon the fact that shipments by canal showed a marked increase last year. This is due, the board thinks, to the rise in rail freight rates and the large increase in the amount of grain shipped to the seaboard. The increase in freight carried by the trunk lines last year over 1885 was only 152,297 pounds, while the canals carried 5,293,982 pounds, against 4,731,784 for 1885.

The Welland Canal showed an increase of 34 per cent. over 1885, a significant fact as affecting the commerce of the United States, the board states. The depth of the Welland Canal is given as 12 ft., which is to be increased, while the depth of the Erie Canal is only 7 ft. The Legislature is requested to make a note of the difference.

Fatal accidents during the year show an increase of 92 over those of 1885. Several pages of the report are occupied with a description of them and the manner in which they occurred. During the year the board disposed of 20 "references" to the Governor, the Legislature, and its committees, against 5 for 1885. The report refers to the failure of Congress to regulate inter-state commerce, and designates the lack of such a law "a constant source of embarrassment to the commission." The Legislature of 1886 passed only one of the bills recommended by the board, that limiting the compensation of receivers. Reference is made to some weak points in the General Railroad act. The board thinks stockholders should have a stronger voice than they appear to have in the management of railroads.

Railroads in Michigan, 1885-86.

The fourteenth annual report of the Railroad Commissioners of the State of Michigan is a little later than usual in publication. This delay is due to the sickness of the Deputy Commissioner, Mr. W. C. Ransom, who has superintended the work of tabulation. His absence has been severely felt, and has made the statistics less trustworthy than usual. In spite of this, it contains much valuable matter.

The new construction for the year 1886 is estimated at 261½ miles; against 127 in 1885, 154 in 1884, and 655 in 1883. Nearly two-thirds of the additional mileage for 1886 has been built for two companies—the Detroit, Bay City & Alpena and the Toledo, Ann Arbor & North Michigan. The total track mileage at the close of 1886 is estimated at 5,509 against 5,247 at the close of 1885.

The capital stock in 1885 amounted to $280,000,000; the indebtedness to $347,000,000. Less than three per cent. of the stock was owned in Michigan. The stock and debt per mile of road averaged $54,234; the cost of road and equipment, as entered on the balance sheets, about $50,000 per mile. The change in these respects, as compared with the preceding report, was trifling:

Financially, the year 1885 was even worse for Michigan roads than for those of most other states. In spite of a decrease of more than 10 per cent. in interest and rentals, only seven companies (out of a total of fifty-three) were able to pay dividends. The average return to the shareholders, on the aggregate stock capital, was only 1.54 per cent. On the other hand, it should be noted that only three companies failed to meet operating expenses—a smaller number than in any previous year since the commission was organized.

The passenger business shows a decrease of nearly 10 per cent. in earnings. Apparently there has been a decrease both in passenger mileage and in average rates; but there are errors in calculation which make it impossible to speak with confidence on the latter point. Freight earnings have declined 4.72 per cent. in the face of of a decidedly increased freight movement. The aggregate tonnage was 37,037,544 in 1885, against 36,479,844 in 1884; the ton-mileage 6,416 millions in 1885 against 6,164½ millions in 1884. But one-third of this was through freight, carried at less than ⅘ of a cent per ton-mile; and since the increase came mainly in this item, the roads derived no benefit from it. The average rate on all freight per ton-mile was only 0.82 cent, against 0.90 in 1884, and 0.99 in 1883.

In spite of the additional traffic, the freight-train mileage was diminished about one per cent. The earnings per freight train mile were $1.36 against $1.43 in 1884, $1.56 in 1883, and $1.63 in 1882. In passenger earnings the fall was yet more noticeable. From $1.35 in 1882, they fell to $1.28 in 1883, $1.11 in 1884, and $0.85½ in 1885—a figure which hardly pays expenses. The average earnings per train mile for all trains were about $1.25; *not* $1.49, as stated in the report. In 1884 they were $1.31½; in 1883, $1.46; in 1882, $1.53.

The operating expenses were reduced from $0.93 per train-mile in 1884 to about $0.88 in 1885. They constituted about 70½ per cent. of the total earnings—a slightly better showing than in 1884. This reduction was secured by economy in the maintenance of way, which, of course, cannot be kept up indefinitely. The expenditures under this head were more than 15 per cent. less than in 1884, and constituted little more than one-fifth of the whole amount of operating expenses. General expenses and taxes were reduced 8½ per cent.; transportation expenses, 5 per cent.; while car maintenance *increased* 3 per cent. In spite of this last fact, the estimated value of the equipment shows a decided decrease during the year. The number of employés at the close of the year was 18,630, a decrease of 7 per cent.

The record of accidents shows a decrease in the total number of casualties, but an increased number of deaths—123 persons were killed and 316 injured in 1885, against 102 killed and 393 injured in 1884; 7 passengers, 45 employés and 58 other persons were killed; 29 passengers, 229 employé and 58 other persons injured. The proportion of employés killed was 1 to every 414 in the service. The causes of death or injury were as follows:

	Killed.	Injured.
Collisions	5	11
Coupling cars	10	105
Derailments	1	25
Falling from trains	11	15
Getting on and off trains	12	36
At highway crossings	15	12
Miscellaneous causes	19	69
Overhead obstructions	1	5
Trespassers on trains	5	18
Trespassers on tracks	44	18
Total	123	314

The only individual item showing a marked change was car-coupling, which shows a decrease of 30 per cent. in the number injured, although the automatic coupler law of 1885 was not to take effect till the middle of 1886.

The work of the commission with regard to complaints of discrimination was unimportant.

An Australian Station on a Holiday.

A correspondent of the Indian *Railway Service Gazette* writes as follows of the dispatching of trains from the station at Adelaide, South Australia, Nov. 9, the Prince of Wales' Birthday, which is a great holiday there:

On the morning of the 9th I took a friend who was on a visit to the city to the railway terminus during the height of the traffic as train loads were pouring into the city from one direction to take train or tram to the principal pastimes provided. We took up a coign of vantage opposite the interlocking station furnished with 90 levers which was under the command of *one man* who marshaled the working of the whole train service, shunting engines, etc. The terminus of Adelaide, South Australia, is very cramped, and the whole passenger traffic has to be crowded into a confined space of five short lines and three platforms. The yard inspector—a smart man with an extensive London experience—stood between the lines issuing his orders to shunting engines as he required them; four of these were fully engaged. The station master at one end of the platform watched the indicator signals and started his trains from the departure platform. Train after train arrived, and as it came in and its living freight was discharged, it had to be dealt with and arranged for; not only the train disposed of but the engine also. Here comes one of the 50 trains running nearly every fifteen minutes between Adelaide the Port, and Semaphore; a train of 14 carriages arrives as it draws in, this leaves again in five minutes. The departure engine is let by the signal man out of his stand bye-line on to his train, the arrival engine waiting at terminal buffers until after that train departs. No sooner is the engine on to its train, away go over some six or seven points, and down goes the signal; a train with two powerful ghát engines from the hills with hundreds of passengers from thence, each lady fairly loaded with the beautiful flowers and ferns from the hills. No sooner is the train into the platform then chirp goes the whistle of the little shunting engine; over go more levers, and points all main signal at danger, off goes a small ground indicator attached to siding points, and out comes the shunting engine on to the train just arrived. The Port suburban is ready for the road filled with city passengers going for a day out to the sea beach, and beautiful piers at either Grange, Semaphore or Largs Bay. The 14 carriages again cramped—no sooner away than in comes a train from Glenelg, not so heavily crowded, but the engine is traversed over at dead buffer ends to another line ready to take its place to pull out an immense concourse going to view the review near the beach beyond the pretty watering place. The hill train has next to receive

attention; the shunting engine and train move out to one of the goods yards under regular signals, and as it passes out the yard inspectors inform the shunting porter what has to be done with that train, and where placed ready for another trip; after them slowly follow the two ghát engines which proceed to the engine-shed, but before they pass the signal posts fresh levers and signals have to be moved; next the engine that brought the port train in has to be got out to its stage, where coal, coke and water have to be put on board, and he takes his turn. Next the Glenelg train engine has arrived at his signals, and awaits the signalman's orders by semaphore signal to take his place and proceed with 14 Yankee coaches fairly alive inside and on the platform with passengers. Tramp, tramp, bands playing, next arrives on the scene a regiment of volunteers. Just as they file up on the platform the train and engine are moved over from goods-shed to receive them. Again another Port train arrives. Just after she takes up her position five whistles from the engine-shed and two large ghát engines move slowly and solemnly over from one side of the yard to the departure platform, take up their places in front of a train fairly crowded with holiday-seekers off to the magnificent hills beyond and above the fair city of Adelaide. The Port train next leaves, next the volunteers amidst deafening cheers and enlivening bands of music, next the two powerful locomotives fully braced up for the heavy work over long embankments beneath dark tunnels and over dazzling viaducts. These two splendid specimens of locomotive builder's skill call forth the admiration of even my friend; one is a Yankee of immense size, weighing over 90 tons, the other one of Beyer & Peacock's 18-in. cylinder engines, the whole equipped with the "Westinghouse automatic brake." As soon as these are gone, a shunting engine moves over with several carriages and brakevan. Next from under the overbridge three short and two long shrill whistles are given, and slowly comes trucks loaded and empty—this is one of the regular mixed trains for the north. As soon as one shunting engine delivers the carriages it returns, then the goods vehicles, and away goes that shunting engine. Each receives his orders from the yard inspector what is the next work, then the engine is signaled out and away it goes. No sooner away than other trains arrive, and engines and trains have to be dealt with. The station-master signals to the yard inspector, who at once blows his mouth whistle; more carriages required for such a train, and in a minute over go points and signals, and out pops the shunting engine with extra carriages for hill train.

One difficulty which it is hoped Indian railway management will avoid is found here. On the South Australian Railway there are three classes of continuous brakes; on Port line, the old Westinghouse "direct air brake" (this was first utilized in England on the Metropolitan Railway and adopted in the earlier railway progress of that colony). When the Hills line was open it was known not to be so safe as the automatic brake, when the Westinghouse automatic brake was next introduced, and this has answered admirably. But parliamentary influence was brought to bear, and Wood's Victorian brake was tried, and proved to be an ignominious failure. Again a Mr. Adams influenced the powers that be to adopt his "automatic vacuum brake." This is used on the North line trains. Now none of these carriages fitted with opposite brakes can be utilized, although by aid of extra pipes the two Westinghouse systems can work with each other, but even this interferes with the "brake power." Just imagine not only all these trains to be arranged for, but each system of carriages having to be kept separate. Wood's brake carriages are worked by extra pipes with Westinghouse's, but the brakes are useless and *vice versa;* so any one will acknowledge the severe strain unnecessarily placed upon the working staff of the locomotive and traffic at a time like this.

To show what this strain must have been on the day in question, the following passengers traveled over the various railway systems from Adelaide on Port Semaphore and Largs Bay lines, 18,000; on the Hills line, 6,000. On the former there were 50 trains, on the latter 20. On the North line, 2,000. But Glenelg—owing to the volunteer review, carried 25,000 independent of the troops. This service was exceptionally crowded, and on the return train, in the evening, the passengers were packed like sardines in a box. Coupled with the above the leading tram lines were equally busy; 8,000 travelled over the Kensington system, 4,000 to Burnside, 6,000 on the North Adelaide, 2,200 to Walkerville, 3,200 to Maylands, and 4,000 over the Mitcham system. As four other tram companies have not published their returns, at least another 6,000 persons must have patronized them. But this takes no note of coaches, cabs and express vans which took large numbers of Sunday School children and others to picnics in all directions.

While writing of the brakes I have avoided noting only one failure. Wood's has never gone beyond the experimental stages, and a good deal of loss must have been incurred in testing it; it proved totally unsuited, although the Locomotive Superintendent, Mr. Thow, strongly recommended it both while on the board for approval of brakes in Victoria, as well as by trying to introduce it on his own line in South Australia. The automatic vacuum is being tested, so I reserve any opinion on that. Mr. Westinghouse's two brakes have ever given satisfaction; there was one failure, but who was to blame? *not the brake*, but the parsimony in not properly fitting up the *guard's* van. The guard opened a release cock of the carriage in front of his brakevan, and the driver could not pump up air to work with. Both driver and guard were new to the automatic brake, and had both worked the old direct air brake. One thing, the vacuum automatic brake is fully equipped—a thing not yet accomplished even with the "Westinghouse automatic." The vacuum has not been tried on the Hills railway in regular working, and the grades on the North line are far lighter, and the stations greater distances apart and traffic much lighter; all these ought to be considered when any report appears from the South Australian Railway *re* brakes.

TECHNICAL.

Locomotive Building.

The Brooks Locomotive Works in Dunkirk, N. Y., are building 5 freight and 3 switching engines for the Cincinnati, Hamilton & Dayton road.

The Boston & Lowell shops in Concord, N. H., have recently completed 2 passenger engines for the road, and are building 2 switching engines.

The Canadian Locomotive Co., in Kingston, Ont., is to build several new locomotives for the Prince Edward Island road.

The Rogers Locomotive Works in Paterson, N. J., have an order for 10 locomotives for the Baltimore & Ohio road.

The Car Shops.

The Litchfield Car Works, in Litchfield, Ill., have taken a contract to build 250 cars for the Cincinnati, Hamilton & Dayton road.

The Chicago & Northwestern Co. has let contracts for 3,200 new freight cars. The contracts have gone to several parties.

The Terre Haute Car Co., in Terre Haute, Ind., have taken a contract to build 250 cars for the Cincinnati, Hamilton & Dayton road.

The car works of Osgood Bradley & Sons, in Worcester, Mass., are building 20 first-class passenger cars for the Boston & Lowell road.

The Indianapolis Car Co. in Indianapolis has taken contracts to build 250 box cars for the Cincinnati, Hamilton & Dayton road.

A number of freight cars supplied with the Eastman heater are now running on the Pittsburgh, Cincinnati & St. Louis road.

Bridge Notes.

The cables which suspend the railway suspension bridge at Niagara Falls have been transferred from the old stone towers to the new steel ones.

The Chicago Forge & Bolt Co. in Chicago is furnishing the work for a new steel draw bridge over the Chicago River. The company is also to furnish the steel and iron work for the new ore docks at Ashland, on Lake Superior.

The King Iron Bridge Co. in Cleveland, O., is building a bridge over the Lackawanna River at Old Forge, Pa. It is a highway bridge.

Manufacturing and Business.

The Cleveland Ship Building Co., recently incorporated, in Cleveland, O., has purchased an extensive tract of land in that city, with some 700 ft. water front, and will soon complete its works for the construction of iron and steel vessels.

At the last meeting of the stockholders of the Jersey City Iron Works Mr. James Brahn retired from his connection with the company. Dr. E. S. McClelland was elected President and Mr. Walter C. Meaker, for ten years past Secretary of the company, was chosen Secretary and Manager. The company will continue the manufacture of switches, frogs, crossings, automatic and safety switch stands, in Jersey City as heretofore.

The Mississippi Glass Co. in St. Louis has an order for 13,000 pressed glass deck-lights for new cars now building for the Manhattan Elevated lines in New York.

Iron and Steel.

The annual meeting of the Western Iron Ore Association was held at Cleveland in December. The following officers were chosen to serve another year: President, Hon. George H. Ely; Secretary, W. D. Rees; Executive Committee, George H. Ely, Minnesota District; Samuel L. Mather, Fayette Brown and W. D. Rees, Marquette District; John F. Van Dyke and M. A. Hanna, Menominee District; James Pickands and H. A. Tuttle, Gogebic District; E. A. Hitchcock, Missouri District.

The Champion Steel & Iron Works put their rolling mill at Springfield, O., in operation in November last, and are running very successfully.

The Cornwall Iron Co., Limited, has been organized to succeed R. W. Coleman's heirs, operating the Bird Coleman, the Dohehmore and the Cornwall furnaces in Lebanon County, Pa.

The Claire Furnace Co. is building a new blast furnace at Sharpsville, Pa., which will take the place of the Old Mt. Hickory furnace.

Irondale Furnace in Wythe County, Va., with 4,000 acres of land, has been sold to W. C. Bullitt, of Philadelphia, for $130,000.

The Old Dominion Iron & Nail Works Co. will have its Bessemer steel plant in Richmond, Va., in operation in April next.

The Chickies Iron Co. will have its new blast furnace in Lancaster County, Pa., in operation.

The Rail Market.

Steel Rails.—The demand for steel rails is still active, but the mills are not anxious to close orders, most of them being full of work. Quotations are still higher and prices for ordinary sections are given at $37.50@$38.50 per ton at Eastern mills, and it is said some orders have been placed at $39.

Rail Fastenings.—The market is active and prices higher. Spikes are quoted at 2.60 cents per lb. in Pittsburgh; track-bolts 3.10@3.25, and splicebars 2@2.10.

Old Rails.—The market for old iron rails is more quiet, but prices are firm, and quotations are $25@26 per ton at tidewater. There are no old steel rails on the market at present, and no quotations can be given.

Blast Furnaces of the United States.

The *American Manufacturer* (Pittsburgh) of Jan. 8 says: "Our usual monthly report of the blast furnaces of the United States gives the condition of all the furnaces of the country Jan. 1, 1887.

"As compared with one month ago there are some material changes. The condition of the charcoal furnaces is practically the same, but there has been an increase of 11 furnaces in blast in the anthracite region with an increased capacity of 2,999 tons weekly, and though the number of bituminous furnaces in blast is 1 less than Dec. 1, the capacity of those in blast is 1,300 tons greater.

"In a condensed form, the table makes the following showing:

	In blast.		Out of blast.	
Fuel.	No.	Weekly capacity.	No.	Weekly capacity.
Charcoal	66	11 895	110	12,466
Anthracite	126	53,633	77	18,043
Bituminous	140	80,132	69	29,937
Total	332	127,660	256	60,446

"Every important anthracite district shows an increase except the Lehigh Valley, where there is no change. There is an increase of 1 furnace in blast in New York, 2 in New Jersey, 3 in the Schuylkill Valley, 3 in the Upper Susquehanna and 2 in the Lower. There are 2 less bituminous furnaces in blast at Pittsburgh, "B" and "C" Edgar Thomson, which are being relined, 1 more in the Shenango, 1 more in the Youghiogheny, 1 less in West Virginia, 1 less in the Mahoning Valley, 1 more in Tennessee, 1 more in Alabama, 2 less in Illinois.

"The production of iron during December has been somewhat less than the average, owing to short supplies of coke, but the total production on Jan. 1, 1887, was probably greater than ever before in the history of the country. The reported capacity of anthracite and bituminous furnaces in blast has never been exceeded."

The number of furnaces in blast and their weekly capacity on Jan. 1, 1887, compares with the statement of Jan. 1, 1886, as follows:

	Jan. 1, 1887.		Jan. 1, 1886.	
	No.	Capacity.	No.	Capacity.
Charcoal	66	11,895	57	7,804
Anthracite	126	35,633	104	29,811
Bituminous	140	80,132	112	59,436
Total	332	127,660	273	97,051

The increase during the year in the weekly producing capacity of the furnaces in blast is thus: Charcoal, 52.5; anthracite, 19.5; bituminous, 34.8; total, 31.6 per cent. The average weekly capacity of the furnaces in blast Jan. 1, 1887, was 385 tons, against an average of 355 tons a year ago.

Car Doors.

The Wagner Car Door Co., of Indianapolis, Ind., reports a business of satisfactory proportions. Their car door has been ordered apolied to the following lots of cars recently contracted for: 500 for the New York, Lake Erie & Western 1,100 for the Newport News & Mississippi Valley Co.; 700 for the Buffalo, Rochester & Pittsburg; 200 for the Louisville & Nashville; 500 for the Grand Rapids & Indiana; 300 for the East Tennessee, Virginia & Georgia, and 275 for the Colorado Midland.

Indurated Fibre Ware.

The Indurated Fibre Co., of Lockport, N. Y., has received the following reference to its pails from Mr. W. H. Purcell, Secretary of the Fertilizer Manufacturers' Mutual Fire Insurance Co. of Baltimore:

Mr. Purcell, writing under date of Dec. 14, says: "During the recent severe frost that we have experienced in this section, your pails stood the weather test much better than the ordinary metal buckets used. We will have no hesitation in recommending these pails for use as fire pails on every occasion where it is necessary that we should make recommendations of buckets for that purpose."

The company has filled orders for these pails from several leading railroad and steamship lines, and the fact of their standing the weather test better than the ordinary article is of interest.

Turkish Railroads.

A cable dispatch says that a syndicate of Paris and Berlin bankers has subscribed $120,000,000 to build a railway connecting the Black Sea with the Persian Gulf. At present Turkey has only 1,100 miles of railroad, 900 of which are in Turkey in Europe.

The 24-Hour System.

The 24-hour system will not come into use on the Union Pacific road, as anticipated. The order directing its adoption at the next general change of time-tables, to which we have heretofore referred, has been revoked. This, it is understood, has been done by direction of President Adams, whose opinion is that the time for the adoption of the new system has hardly come yet.

American Society of Civil Engineers.

A business meeting of this Society was held on the evening of Wednesday, Jan. 5. The annual meeting of the Society will be held on Jan. 19, and excursions will be taken the next day to some points of interest in the neighborhood not yet definitely determined. After the business was disposed of, a number of written discussions of Mr. Dorsey's paper on Irrigation were read.

These discussions developed mainly the following points:

1*st.* "Duty" (so called) of Irrigation water. This is the number of acres which one cubic foot of water per second flowing through the irrigation canal will irrigate. This ranges from 56 acres on the very lavish system in vogue in Colorado, to 1,500 acres on the hose watering system used in California for orchards. Under the latter plan only a small space immediately around each tree is watered. For a true irrigation system conducted economically, the duty may be set down as 150 to 200 acres, according to the amount of rainfall of the region, and assuming that the region will not produce a crop which will pay for cultivation without irrigation. Of course, where there is enough rainfall to get along with except in very dry times the duty will be increased over the above figures.

2*d.* The injurious effects of irrigation on certain crops. From the California experience it is not at all clear that irrigation is advantageous for cereals in proportion to the expense of irrigating.

For clover and roots of all sorts it is generally admitted to be highly profitable.

For fruits of all kinds there is strong opposition to it in California. It is reported to increase the size of fruits, but to render them insipid and less able to bear transport.

3*d.* The abrogation of riparian rights. The laws of the states and territories where irrigation is absolutely necessary to secure crops, such as Colorado, Utah and Wyoming, have repudiated the right of the riparian proprietor to the water of streams unless actually used by him for irrigation, viz., an irrigation company may appropriate the entire flow of a stream not yet made use of for irrigation, but if they do not carry the whole flow, other parties may appropriate any portion of the flow which is not needed to fill the canal of the parties already in possession

The Meigs Elevated Railroad.

The Meigs elevated railroad scheme in Boston has just been reported on by Mr. Geo. Stark, Civil Engineer to the State Railroad Commission, as to the safety and strength of the structure and rolling stock.

The experimental section of the road has been set up on grounds formerly occupied by the Bay State Glass Co. in East Cambridge and extends over Bridge street to the property of J. P. Squire. It is built entirely upon a soft mud bottom in which a ⅝-in. bar can be readily forced down 12 ft. by one man, and all sorts of grades and curves have been introduced into the line—one of the curves making half a circle of 50 ft. radius and on a 120 ft. grade.

Mr. Stark caused the girders used to be loaded with 30 tons at the centre and obtained a deflection of $\frac{7}{16}$ in. without any permanent deflection. He also applied a side pull of $5\frac{33}{100}$ tons, 20 per cent. in excess of any possible strain by wind, etc., in this direction, getting a side deflection of the girders of ⅝ inch and of the posts ⅛ inch, without permanent deflection in either case:

The engine shown weighed 30 tons, the tender 14 and the passenger car 17 tons, all of cylindrical form.

The general features of the construction of track and rolling stock have already been described and commented on by us.

To test the safety of the rolling stock in case of accident, Mr. Stark had one wheel removed, and the car run over the track in this condition without any apparent detriment or tendency to derailment. The difference in the motion was not noticeable to passengers in the car.

Mr. Stark sums up as follows: "The experimental section of the Meigs elevated railway now in use at East Cambridge is, in my opinion, abundantly strong for its intended use as an elevated railway track, and is safe for the passage of its equipment.

"The rolling stock and motive power used thereon is also strong and safe for its intended use, no breakage having occurred, or being likely to occur, that could imperil personal safety, either in or out of the cars.

"A line of railway, property constructed on this principle, for passenger or freight traffic, and equipped with such rolling stock and motive power, on this principle, as the Meigs company is now prepared to perfect and build, would, in my opinion, be, at least, as strong and safe for any kind of traffic as the ordinary surface or elevated steam railways now in common use.

"In view, however, of the imperative necessity for the best class of design and construction in everything appertaining to an elevated railway, I think it would be wise for the state of Massachusetts, through its board of railroad commissioners, or otherwise, to regulate the strength and design of all materials used in construction, and the weight and design of equipment to be run, etc., as is done by New York, through its 'rapid transit commission,' for elevated railroads in that state."

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

December earnings are reported this week by 40 roads, making a total of 61 that have so far made their reports for the month. The totals for this week and the month are :

	1886.	1885.	Increase.	P.c.
Week, 40 roads.....	$9,546,120	$8,950 864	$595,526	6.6
Total, 61 roads....	23,523,076	21,317,411	2,205,665	10.4

The roads reporting this week are chiefly small lines, although a few of the first rank are in the list, including the Chicago & Northwestern (which had an increase of 7.7 per cent.) and the Illinois Central.

The larger increase, reported are in the Northwest and the Southwest, and most of them are due to increases in mileage or other exceptional causes. The Southern roads do not make a favorable showing, although most of their decreases are small. With one minor exception the roads of the central group show no material changes.

The Philadelphia & Reading report for the year 1886 only completes and emphasizes the unfavorable showing made through the year by the monthly statements, and shows once more the inability of this great property to continue to work under its present load of debt. While the railroad lines had net earnings of $18,266,911, the coal properties returned a loss of $1,147,054, and the joint net earnings of the two companies were less by $4,762,970 than their accruing liabilities. Of this great deficit the sum of $1,27C,086, or a little over one-fourth, was due to the New Jersey Central lease, from which the company will this year be released. The closing of that lease, however, will still leave the company with a heavy deficit accruing yearly, and the most sanguine estimates of future earnings fail to show how the present plan of reorganization will meet the exigencies of the case.

It does not yet appear that any very large deposits of securities have been made under this plan, and the necessity of a foreclosure becomes daily more apparent. The company has a property which will yield fair returns to its owners under good management, but a reduction of the debt to a reasonable amount is an imperative necessity of the situation.

In view of the numerous accidents that have befallen express passenger trains within the last few days, it is gratifying to notice that some companies are taking steps to secure safety appliances, and that interlocking apparatus has been introduced during the last year at several points, and in some cases on roads where it has not been hitherto used. During the last year the Pittsburgh, Fort Wayne & Chicago (which has not previously used interlocking apparatus) has ordered of the Union Switch and Signal Company protecting apparatus at the following nine points : Federal Street Terminal, West Pennsylvania Crossing, Kenwood Junction, Colar Junction, Tolleston Crossing (Mich. Cent.), Liverpool Crossing (Mich. Cent.), and Van Buren, Harrison and Polk streets, Chicago, The work is completed and in operation at the three first named points, which are all situated in Alleghany City.

Some short lengths of Automatic Pneumatic block signals are also at work on the Pittsburgh, Fort Wayne & Chicago. We are informed that this system as applied to block working, and not to interlocking, is also giving good results on other roads, the Pennsylvania and Fitchburg amongst others.

The Baltimore & Ohio has also ordered its first set of interlocking apparatus, which was first put into operation last week at the Willow Creek Crossing on the Baltimore & Ohio and Michigan Central Railroads near Chicago.

The Philadelphia & Reading has just ordered interlocking apparatus for Nicetown, West Falls and Girard avenue, three junctions within the city limits of Philadelphia.

It is very satisfactory to find that railroads are awaking to the necessity of protecting limited fast passenger trains by safety devices which have been tested by time and experience, and have been proved to be efficient. The primitive apparatus in use at Rio, Republic and Elmira sufficed in the early days of railroads, but the increased speed of modern limited expresse trains renders necessary a corresponding advance in safety appliances.

The collision on the New York Elevated road Tuesday night of this week by which through trains on the Sixth avenue line were suspended a whole night, while fruitful of lessons in several different directions, enforces more particularly the fact, which ought to be familiar enough, that facing point switches without distant signals are always dangerous. Doubtless the elevated managers feel safe because they do comparatively little switching at way stations and because their slow speeds are likely to prevent serious disaster ; but the principle applies, nevertheless, and cannot be disregarded with impunity. It is getting to be a serious thing on the elevated, and on other roads, too, to scare the public, to say nothing of hurting them.

We publish in another column a letter from Mr. Franklin McVeigh on the controversy between Mr. Adams and the Chicago Rolling Mills, which describes the situation admirably. The position of the Rolling Mill Co. is a little like that of the little girl who exclaims : "You mean, stingy thing !" to her sister because the latter appropriates a cake that she had failed to get herself.

We hope to treat this question more fully in our next issue.

THE ATTEMPT TO PROHIBIT POOLS.

The Interstate Commerce bill tries to do four things.

1. To secure publicity of rates.

2. To prevent personal discriminations : providing for equal rates to different individuals for the same service and between the same places.

3. To lessen local discrimination : providing that, in general, local business shall not pay a higher aggregate charge than through business over the same line.

4. To prohibit pools.

The first two objects are good. While there are some practical difficulties in carrying them out, the advantage of open rates and equal treatment is much more than enough to overbalance them. They are advantageous, not merely to the public, but in the long run to the railroads also; and the great majority of railroad men would be glad to help in the enforcement of such a system. The third point is a far more difficult one. The clause bearing upon it in the bill now before Congress is vague in its meaning—perhaps purposely so. In one interpretation it would be simply ruinous to the business of the country; but this very fact perhaps furnishes a reason to believe that the courts would interpret it in the mildest sense which the language will bear; and that between the interpretation of the courts on the one hand, and the exceptions which the commission is empowered to make, on the other hand, much, if not all, of the danger would be avoided. We shall discuss this question in our next issue.

The fourth point is unfortunately not treated in this elastic fashion. The bill is explicit in prohibiting pools. It leaves little room for the courts to modify its interpretation, and no chance for the commission to suspend its execution. The section bearing on this subject reads as follows:

> Sec. 5. That it shall be unlawful for any common carrier subject to the provisions of this act to enter into any contract, agreement, or combination with any other common carrier or carriers for the pooling of freights of different and competing railroads, or to divide between them the aggregate or net proceeds of the earnings of such railroads, or any portion thereof; and in any case of an agreement for the pooling of freights as aforesaid, each day of its continuance shall be deemed a separate offense.

In the original Senate bill, there was nothing of this kind ; but it was inserted in the conference bill as a concession to Mr. Reagan. There is unquestionably a strong sentiment—perhaps an almost universal sentiment in its favor among men who do not understand the practical workings of railroad pools, or the practical reasons for their existence. This is not to be wondered at. There is a widespread public feeling against all trade combinations, whatever they may undertake to do ; and an equally widespread jealousy of railroad power, and of everything which seems to increase that power, irrespective of the manner in which it is exercised.

In the brief time remaining before the fate of the bill is decided, it will be impossible to affect or to change this sentiment. But such a sentiment, however strong, would not of itself be likely to carry a measure through Congress without challenge or amendment. The balance of power is probably held by men of another stamp ; men who will let their action be decided by argument rather than by sentiment ; who have some knowledge of railroad business methods and the difficulties involved ; who in many instances preferred the original Senate bill, and had no serious objection to pools, but are willing to vote for the compromise bill because they fear that otherwise all action will be indefinitely postponed.

The feeling of such men is well voiced by Mr. Simon Sterne, in an interview recently published in the New York *Times*. He explicitly says that he is "in favor of pools under existing conditions." But he thinks that the proposed legislation will so change the conditions as to render them unnecessary.

> "If the law in the proposed Interstate Commerce bill be strictly enforced and the commission performs its duty and the courts perform theirs, ending all discrimination and personal rates, there is an end to the main purposes of pooling, because if all the roads are compelled by the government to act honestly there is no necessity for an instrumentality of their own to keep peace between them. Hence this professed fright at the proposed law is without reason. Pools have proved too often valueless for continued public reliance. They are strong enough and well enough when there is business enough to go all around, but when railways are duplicated and traffic is short, when an adversary is to be punished or crushed, when there are sufficient motives, originating in selfishness, then the staff snaps, the pool goes to pieces, the public is mulcted. There will be no snapping, no going to pieces under an honest administration of this proposed Interstate Commerce bill.
>
> "Rate wars would inevitably be stopped were a supervising authority in existence over all the roads. Even granting that this bureau has very limited powers, the influence it would exert would be to keep the peace and discountenance senseless and wasteful competition. Every one knows that the present pooling arrangements will last only as long as the business of the roads is good. Rates are maintained as a matter of course, when more freight is offered than there are cars to transport it. A failure in the crops or a poor business year would promptly cause competition between the roads, and the pooling agreements would not be worth the paper they are written upon. But with an intelligent national railway commission in operation, influence could be used to maintain reasonable rates, for the agreements would have a certain legal status. Then the prohibition to charging more for short than for long hauls would deter the railroads from entering upon rate wars. Under the present system the fights are confined to competing points, which do not average more than 20 per cent. of the whole business of the road; but very few companies would care to cut into their local traffic, where there is no competition, as they would be forced to do under this Cullom act."

We have quoted this passage at length because we think that it represents the honest opinion of a great many men who are now supporting the bill, but are open to argument on this point, and who may not improbably hold the balance of power when the matter comes to a final vote. If we believed that mere legislation could do what these men expect, we should agree with their conclusions. But it is precisely here that we take issue with Mr. Sterne. We do not believe that "rate wars would inevitably be stopped by a supervising authority in existence over all the roads." We do not believe that "the prohibition to charge more for short than long hauls would deter the railroads from entering upon rate wars." We do not believe that the law in the proposed Interstate Commerce bill would be or could be strictly enforced—except by the aid of those very traffic agreements which the clause against pooling is designed to prohibit.

The evidence in support of this view is remarkably strong. It is not confined to any one time, country, or system of management. It is perhaps most decisive in European railroad legislation, because it is there that the experiments in state control have been most thoroughly tried, and under the most favorable conditions. What has been the result? That every country in which discrimination has been really brought under control has recourse to pools as a means of preventing it. In every country of Central Europe they have tried at one time or another to prevent local and personal discrimination without the aid of pools, by provisions like those of the present bill ; and the attempt failed completely. Belgium and Prussia were not able to prevent the officials of the *state* roads themselves from giving secret rebates and personal discriminations, in violation of the statutes on the subject ; and this system continued until the state entered into pooling contracts with the private roads. Attempts to enforce the short haul principle met with no better success. If Mr. Sterne, when he set out to study European systems of control last Summer, looked behind the mere letter of the statute books, he must have found these

facts clear beyond any question. Does he suppose Congress will succeed where Bismarck failed, or that the police power of the United States over private roads is more effective than that of European monarchies over those which they themselves own?

But the evidence is by no means confined to Europe. Let us look at our own country and see where state regulation has been most efficient. The answer would probably be, in Massachusetts in the East, in Iowa in the West, and in Georgia in the South. Now all these states, except, perhaps, Massachusetts, are equally conspicuous as centres of stable traffic agreements of long standing; and the apparent exception in the case of Massachusetts is largely due to the fact that the pooling system of some of the roads about Boston dates back to a time when public attention was not fixed upon railroads and their doings to the extent which it is to-day. This coincidence is no mere accident. Explain it as we may, it is a fact that where discrimination has been stopped pooling has prevailed; that where pooling has broken down, discrimination has run riot.

It is easy for any one familiar with railroad business to understand why this is so. A mere agreement to maintain rates is almost never kept. It can be easily violated, even with the best of intentions on the part of the general management; it is hard to detect such violations, and harder still to hold any one responsible. A pool does not by any means prevent this. There is always a certain amount of rate cutting, and there probably always will be, as long as human nature remains what it is, or until agents are found who will do business without commissions. But a pooling contract removes the suspicion of bad faith from the general management, as long as these things are not done systematically. It does not stop rate cutting completely any more than a good system of demurrage charges system would stop all car detention; but it removes the suspicion that it is done on purpose, and thus prevents recrimination. It prevents the ill-guided enterprise of a few freight agent from resulting in a railroad war. Without a pool, the irresponsible act of an agent of one road leads to exaggerated suspicion on the part of a rival line, which tries retaliation. What was at first done in disregard of the general management, is soon done with its connivance, and is finally carried out systematically--law or no law. When matters have once started on the downward grade, more stringent law only results in a little greater secrecy.

Does any one suppose that Congress can do more to prevent rate cutting than the railroad managers themselves can do when they try? How would the Conference bill prevent the division of commissions? How could it prevent "underweighing" except by establishing a force of deputy marshals at every railroad junction? Unless it could accomplish all these things, it does not do away with the need of pools. It simply insures that the greatest favors shall be granted by the worst roads to the most unscrupulous shippers. It deprives the responsible road and the law-abiding shipper of any slight protection which he may have under the present system.

This is why the governments of Europe accepted pooling as a necessity. In attempting to regulate rates without pools they made a law which the worse roads and worse shippers could break and yet escape detection, and this fact caused every road, state or private alike, to violate it in self-defence. And this is why we look with apprehension on the possibility of Congressional action against pools. Not because it will interfere with railroad earnings, for any effect of this kind is only temporary and sure to be swallowed up by the building of parallel roads, but because it would tend to defeat the main object of the whole bill. We believe that the prohibition of pools would do more to prevent publicity and stability of rates than any direct legislation could do to promote it; that it would increase local and personal discrimination in favor of precisely those shippers who least need and least deserve it.

We are by no means prepared to say that railroad pools have proved an unmixed success. Judging them by their results, there is much reason for some of Mr. Sterne's criticism. But we believe with Mr. Blanchard, that the errors and wrongs which have proceeded from pools are generally not because of the pools, but because some of the parties violate their pledges to them, and that no other system has shown as good results on the whole. It has never had a fair chance. In refusing to hold the members of a pool responsible to their pledges, we have put it at the mercy of its worst members. We have crippled its power for carrying out any far-sighted policy, and have rejected it as a means of railroad regulation. Those who persist in believing, in the face of uniform experience, that we can prevent pooling and discrimination at the same time, are responsible if we retain many of the worst features of both systems side by side.

THE CAR COUPLER QUESTION.

Among railroad men who have paid considerable attention to the car coupler question, there appears to be a tendency to regard certain questions in the great car coupler problem as settled. This is a hopeful sign of an ultimate solution of the whole question, for until certain essential questions are answered and determined by practical experience, both those who wish to adopt a coupler and those who wish their particular coupler adopted are bewildered as to their proper course. When, however, general opinion points to the fact that a certain coupler possesses a specified fatal defect, the inventor recognizes that he must either cure that fault or retire from the field. This is, of course, the operation of nature's law, the survival of the fittest, and the sooner it is recognized the better for the general weal. The couplers that survive will be those that have recognized the defects complained of by railroad men and have to a greater or lesser degree sought and found a remedy.

The car coupler question has also undergone a development in another sense. A few years ago, each coupler then before the railroad world was discussed and judged by its individual merits and demerits. We have now gone a step beyond that, and types of couplers are recognized. The question is now chiefly not which particular coupler shall be adopted by the whole country, but which type of coupler—embracing many individual varieties—possesses the greatest number of meritorious points and the fewest defects. It is largely recognized that if the question of the adoption of a type be settled that the railroads will not be bound to use universally the same coupler, but will have the choice of several distinct varieties of the selected type. This will confer many advantages, giving scope for future improvement, avoiding any monopoly for the sale of car couplers, and permitting master car-builders to exercise some latitude in details. At the same time it seems probable that several varieties of couplers may, with slight modifications, be made to couple as easily with one another as with their own kind. If one coupler were in universal use, the greatest advantage gained by this great change from existing conditions would be the fact that any car would be easily and safely coupled to any other car. Such a consummation is, however, impossible, but these advantages may possibly be gained by the adoption of one type of coupler embracing a dozen varieties, each coupling with one another.

The relative merits and defects of existing types of couplers are now more generally recognized than formerly, and consequently the choice of a type should be easier. Though the experience in practical running with freight trains has added largely to the knowledge of both inventors and railroad men, opinion is still greatly divided as to the best type.

There can be no disguising the fact that the question has been considerably influenced by the result of the Burlington brake trials. These trials showed pretty conclusively that the operation of continuous freight train brakes, whether actuated by compressed air, vacuum, or the buffers, will be greatly facilitated by the use of tight couplings. It is also useless to ignore the strong probability that some form of automatic brake acting throughout the length of a freight train will ere long be very largely adopted in this country. The account of the trial of an electric brake, given in our last issue, shows that it is possible that a brake may stop a train in a short space without shock, even with loose couplings. But unless such a brake can be made practically successful and generally adopted, it seems inevitable that there will be a strong tendency to prefer close couplings wherever automatic freight train brakes are used. Now, as there is every probability that automatic brakes will be very largely used in the near future, it becomes evident that the brake question is likely to have a very important effect on the car coupler question.

The car coupler question is probably, mechanically, the knottiest that mechanical science has been called upon to settle. When one considers the thousands of inventors who have attempted a solution, and the hundreds of different forms of couplers that have been put into practical use during the last thirty years, it might naturally be expected that the only difficulty confronting a railroad was which of the many excellent couplers in the market should be adopted. Strange to say, however, that with some exceptions, there is a very prevalent opinion that *none* of the couplers are perfectly satisfactory and worthy of adoption. Experienced men, who are as free from prejudice as dame Nature will allow, point out what they consider some important defect in every one of the best known couplers. The inventors, many of whom are men of great mechanical skill, and have studied the question of car couplings very thoroughly, are much of the same mind. They will all tell the inquiring stranger that every coupler—except, of course, their own—has one or more defects which render it practically worthless. As a man's opinion regarding his own bantling is naturally biased, it appears that the unprejudiced opinion of inventors coincides with that of many railroad men, that the perfect device for coupling freight cars has yet to be brought before the railroad world.

To those who merely view the fight, but are not in a position to know the actual number of killed and wounded, the views set forth above would appear the very opposite of the truth. An unconcerned mechanical expert would probably be of opinion that many of the couplers now on trial not only possess considerable mechanical merit, but would, if adopted, save an immense number of men from being killed and maimed, and would also effect a saving in the time and money now spent in coupling cars. The testimony of those, however, who are actually in the business, and who know the actual working of the various devices, must have great weight.

A mechanical expert may examine coupler A, B, C and D, and see cars equipped with them run together and be coupled and uncoupled. He may consider them all highly meritorious devices, well worthy of general adoption. The real merits or demerits of the couplers can, however, only be found after an extended practical trial. It is then found that each of them has a very serious defect. A constantly breaks, and the use of a large amount of the best material to be had does not seem to stop, or even diminish, the number of breakages. Coupler B has an invincible tendency to become uncoupled while running, while it is often difficult to uncouple C in the yard. D seems subject to a variety of ills, and is continually coming into hospital minus the car coupler equivalent of a leg or an arm. The railroad man then naturally says that none of these couplers are satisfactory.

The unfortunate inventor on his side endeavors to correct these defects, and especially to render his coupler proof against hard usage, such as a collision with a Potter or Safford drawhead at 15 miles per hour. But unfortunately in strengthening his coupler, he runs into another danger. It is already a matter of complaint that some of the patent drawheads are so heavy that three men are necessary to place them under a car, two men being unable to lift the weight of the drawhead, etc., complete. In some cases three men take fully half an hour to replace a drawhead, while the common Pennsylvania pattern wrought-iron drawhead can be replaced by one man in four minutes actual time. This question is a serious one. Parts must not be made too heavy to handle, and yet the strength must be sufficient to meet the concussion of the immense cars that are fast coming into use on many roads.

On one prominent road, the officers are disposed to consider the vertical plane as the best type, but consider that the joint of the knuckle is dangerously exposed in all forms of vertical plane couplers, and that the proper means to cure the evil is not to strengthen the coupler and so still further increase its weight, but to divide the work the coupler has to perform. The damage is principally or almost entirely done by the concussion in buffing, and it is done because a knuckle working on a pin is a very unsuitable form to resist a blow. It is, therefore, proposed to use a vertical plane coupler for traction alone, and to take all the heavy buffing shocks on suitable buffers, especially made for the purpose of standing the blows and nothing else. These buffers would, of course, have flat or slight rounded faces, and would be carried by stout spindles and backed by springs. The use of such buffers has been found necessary in passenger cars here, and is, of course, universal in Europe on both passenger and freight cars. There can be no doubt that were their use general here, the number of broken couplers would be largely reduced. In order, however, to be useful, springs should be generally adopted and should be placed at a uniform height and distance apart. While the road on which the suggestion originated proposes to use the buffers in connection with a vertical plane couple, it is manifest that most, if not all, couplers of other types would benefit immensely by being relieved of all the violent blows in buffing. The suggestion deserves, therefore, the careful consideration of all concerned, especially as the increasing weight of engine and cars renders it absolutely certain that the violence of the shocks to which couplers are now subjected will be greatly increased in the next few years.

It is well to note in this connection that where solid

trains are now run with one coupler few breakages occur except between the tender and the next car. This is a proof that the extremely rigid nature of the drawhead on the back of the tender is more destructive than the ordinary coupler provided with a spring.

It is obvious that the car coupler in question would be more speedily settled were the railroads to take common action in the matter or to empower one body or committee to fix upon a coupler or type of coupler for general adoption. Unfortunately there seems little likelihood of any general action in the matter. Each railroad appears desirous of maintaining its independence of action, and of trying what couplers it deems best, and declines to abide by the results of a trial conducted by a committee of experts. Roads, however, that have applied one coupler to a large number of cars still profess willingness to try another device, should it present advantages over any in use and be likely to be generally adopted. They, however, decline to be bound by the action of other companies or of a committee.

The only possible committee on this question is that of the Master Car-Builders' Association, and it is certainly greatly to be regretted that they have not made a more vigorous use of their position, and pushed the question and conducted the trials in such a manner that considerable experience would be gained as to the behavior of the different car couplers.

Unless, however, some active steps are taken by the members of the Executive Committee, it is to be feared that they will have little to report to the Association at the next convention. The style of report which dwells upon "unexpected delays and difficulties which have rendered impossible any adequate much less final report on the question" is not calculated to strengthen the position of the Master Car-Builders as a body before the public, or to induce the presidents and general managers of the large railroads to intrust the settlement of the car coupler question to the persons who are really most competent to determine the merits of the question, the master car-builders of this country.

We would therefore urge upon them the necessity of being up and doing and of being able to present to the next convention a clear and definite report as to the behavior of the different couplers, which should now be undergoing an extended practical test on a large number of cars.

The Hoosac Tunnel Consolidation.

The final disposition of the Hoosac Tunnel property has at last been settled, and, as has appeared probable for some time, the Troy & Greenfield road, which the state of Massachusetts built and has heretofore owned, goes to the Fitchburg Railroad Company, which has been the line chiefly benefited by its construction. The state receives for the property $5,000,000 in bonds, which are to bear 3 per cent. interest for five years, 3½ for five years more and 4 per cent. thereafter, and also receives the further amount of $5,000,000 in common stock, the value of which will be, of course, contingent upon the earnings of the company.

The contract appears to have been carefully considered and prepared. The new company, which is to be formed by the consolidation of the Fitchburg and the Troy & Greenfield, will have $7,048,800 in 4 per cent. preferred stock, which will go to the present Fitchburg stockholders; $5,000,000 in common stock, which will be held by the state, and which will share equally with the preferred in all profit over the 4 per cent. on the stock; the $5,000,000 bonds held by the state, and the present liabilities of the old company. The capitalization will be, in round figures, as follows:

Preferred stock	$7,048,800
Common "	5,000,000
Fitchburg debt, market value	6,000,000
State bonds	5,000,000
Vermont & Massachusetts, market value	5,000,000
Total	$28,048,800

The consolidation, however, carries the road only to North Adams, and to complete the line to the Hudson River requires the addition of the Troy & Boston or the Boston, Hoosac Tunnel & Western road. It is announced that arrangements are nearly completed for the acquisition of both of these roads, as has been already reported, although it is stated that the price to be paid for them has been greatly magnified by rumor. In all it seems probable that the consolidated line, including a duplicate line from North Adams to the Hudson, and the Mechanicsville and Saratoga connections, will be completed on a total capital of about $37,000,000 in stock and bonds, interest payments being obligatory on not much over half that amount.

The consolidated line, with its large and profitable local traffic, will certainly be able to earn the dividend on its preferred stock and probably something on the common also. Under a single management it should be able to get a larger share of the through traffic than it has heretofore had, and will thus compete more actively than before with the Boston & Albany. To some extent that road may be injured, but there is probably room and a fair profit for both.

The railroad property which the state thus parts with cost for actual construction about $14,000,000, while interest payments and other charges have brought its total cost up to $24,200,000. The state has now outstanding $14,200,000 bonds issued on the tunnel account, interest on which it must continue to pay. Nevertheless, although the price is apparently small in proportion to the cost, it seems probable that the sale is a wise measure, and that as good a bargain has been made as could be expected under the circumstances. To realize anything like the cost was clearly impossible, and the liability of the state is now clearly fixed and determined by its outstanding bonds, in meeting which it will receive considerable aid from the securities which it takes in payment.

From the railroad point of view, however, the price paid for the 44 miles of the state road, without any equipment, is a high one. The price is $113,636 per mile in bonds and an equal amount in stock, with an interest charge increasing from $3,419 per mile the first year to $4,545 per mile yearly after ten years. This seems at least a fair price, and is probably a greater one than could have been obtained had there not been a probability of a sale to a competing line—the Boston & Lowell—which made the purchase necessary to the Fitchburg Company, unless it should decide to retire from the field as a competitor for through business, which it could hardly do with prudence or safety in view of the large investments it has already made in that direction.

West-bound Business in 1886.

The through shipments from New York westward by the trunk lines in December, 1886, were 98,344 tons. This is a larger tonnage from New York than the trunk lines have had in any December since the formation of the west-bound pool in 1877, except in December, 1881, when the shipments reached the phenomenally large figure of 113,800 tons; but at that time a very bitter railroad war was raging, and the extremely low rates which then prevailed no doubt attracted to the railroads a large amount of heavy, coarse freight, which under ordinary circumstances would have been forwarded by water before the close of navigation or not shipped at all. While as a matter of fact the tariff rates were not absolutely maintained during December last, it being generally conceded that there were many contracts at cut rates in effect, there certainly was no general demoralization of rates, and tariffs were probably as well maintained as they usually are, except when railroads, suffering from the serious losses incident to a war of rates, are temporarily virtuous to an extreme.

The December shipments from New York for ten years have been:

Year.	Tons.	Year.	Tons.
1877	52,901	1882	75,685
1878	50,013	1883	72,425
1879	82,418	1884	72,568
1880	74,059	1885	82,956
1881	113,800	1886	98,344

As compared with the corresponding month of the two preceding years, the December shipments in 1886 were 19 per cent. more than in 1885 and 35.5 per cent. more than in 1884.

As remarked in our review of the traffic for November last, it seems astonishing that while in every previous month in 1886, except February, the New York shipments were less than in the corresponding month of 1885, that there should have been so great and sudden a change as is indicated by the large shipments for November and December. How far this result is in consequence of the contracts which it is claimed existed prior to Jan. 1, 1887, is, of course, unknown. As the increase in the shipments as compared with the movement in December, 1885, is entirely in low class freights, it is probable that the extraordinarily large traffic in imported steel blooms, billets, etc., during November continued during December.

The shipments from New York for the six months ending with December have been as follows during the last seven years:

Year.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total.
1886..	86,738	100,741	108,416	95,649	102,462	98,344	592,350
1885..	102,397	106,447	127,195	117,191	85,726	82,956	621,912
1884..	92,222	101,040	106,819	92,254	78,943	72,568	543,846
1883..	81,959	96,991	92,102	91,448	74,978	72,425	509,993
1882..	79,464	115,862	115,056	118,840	79,599	75,685	584,506
1881..	73,114	120,886	141,174	142,474	114,592	113,800	706,040
1880..	78,193	92,042	99,480	86,858	82,002	74,059	512,634

The shipments for the six months ending with December of last year are 29,000 tons less than they were for the corresponding six months of 1885, but are larger than the shipments for the corresponding six months of any other year since 1881. In 1881 the shipments for the last six months of the year were 706,040 tons, but this abnormally large tonnage was the result of the very low and unremunerative rates which prevailed in consequence of the railroad war which did not end until the early part of 1882.

So far as the last six months of 1885 is concerned, it must be remembered that prior to Oct. 1 the tariff rates from New York were on the basis of fifty cents per 100 lbs. to Chicago on first-class. On Oct. 1 the tariff was advanced to the basis of sixty cents on first-class; and on Nov. 18 another advance was made to the basis of seventy-five cents.

The tariff rates during the entire year of 1886 have been on the basis of seventy-five cents on first-class, and taking into consideration the lower basis that prevailed the greater portion of the last six months of 1885, and also the fact that there were probably many more contracts at cut rates in existence during that time, it is a matter of surprise that there was not a greater difference in the shipments during the two periods. The trunk line west-bound shipments from Philadelphia for December, 1886, were 21,667 tons. This is an increase of more than 25 per cent. over the shipments of December, 1885. As at New York, the increase has been wholly in low class traffic, probably scrap iron, blooms, etc., for Pittsburgh and other manufacturing cities.

The December shipments from Philadelphia during the past eight years have been as follows:

1879	1880	1881	1882	1883	1884	1885	1886
21,751	16,600	20,859	19,407	14,428	12,644	17,311	21,667

It will be seen that the shipments last December have not been equalled in any December since 1879, when they were practically the same.

The December shipments from Baltimore do not show as favorably as the traffic from New York and Philadelphia. While at the two other cities there was a marked increase in the December shipments in 1886 over the shipments for the same month in 1885, the shipments from Baltimore were about the same in December of both years.

The December shipments from Baltimore have been as follows:

1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
36,129	16,986	10,617	10,866	9,159	10,499	12,788	12,473

While the shipments were about the same in 1886 as in 1885, they are materially larger than the shipments for the same month any other year since 1880.

The Collision on the Baltimore & Ohio.

This terrible calamity (at Republic, Ohio, Jan. 4, as noted last week) still occupies the public attention, the evidence before the coroner's jury, although not, at this writing, all in, tending to show the worst aggregation of disastrous circumstances and the least appearance of anything in the nature of palliation connected with any similar occurrence in recent years. Pure carelessness of the grossest kind seems to lie at the door of nearly, or quite everybody who had any responsibility whatever in connection with the matter, even remotely. The freight engineman was a whiskey drinker; both he and the conductor, when losing time, kept their watches in their pockets half an hour at a time; the passenger runner was not keeping a sharp lookout (and doubtless would have greatly mitigated the severity of the shock if he had); the division superintendent or trainmaster had men of this sort running his trains and yet let them continue to run. This, we say, seems from present information to be the case. We hope it is not so bad, and shall be only too glad to hear that the blame is not so widespread. It is some little satisfaction (of a sickly kind) to know that only one or two were derelict. Worse disasters from similar causes have occurred, as at Camphill, near Philadelphia, July 17, 1856, when 66 persons, mostly children, were killed; and on the Erie, west of Port Jervis, July 15, 1864, when 60 or more, mostly Confederate prisoners, were slaughtered; but in these cases only one or two persons were to blame. And warnings in the same line are presented almost every day now. Since the Republic collision, a drunken freight conductor at Wawasset, Pa., allowed a following train to run into his caboose, and he and a companion were killed and burnt up in it; a passenger train on one of the trunk lines had a collision (happily escaping, however, without serious damage) because somebody forgot—so the reports say—that a new time table had gone into effect.

The temperance question cannot need discussion in these columns; whether these accused men had imbibed freely or only moderately matters little. If the warnings of the past in this respect have not been heeded no amount of talk will avail. But even admitting that liquor had little or nothing to do in the case; the warning is in the same line, for the one thing that includes this and all other faults and weaknesses of employés is discipline. When a train-master knows that he has rum-drinking men in responsible positions he quite likely removes or reforms them; but the trouble is, he *does not know*, in any just or reasonable sense. Either he does not appreciate his responsibility, or his superiors give him too much work, or too little assistance; or for some other reason, he allows his faith in his men's reliability to rest on too slight a foundation. If a runner is found to be a frequenter of saloons he is perhaps tolerated because his train is a work train or something of similar comparative secondary importance, whereas the only safe thing probably is to heroically discharge him; a fireman is promoted to the other side of the cab because his general record is good, when perhaps his beer-drinking, though moderate, is *increasing* month by month. Freight conductors and enginemen who habitually indulge in careless habits, such as depending upon each other to take proper precautions (without sufficiently frequent consultations), are allowed to continue this dangerous thoughtlessness because the superior lacks the time to acquaint himself with such "small matters." Enginemen of fast trains indulge in the lazy practice of gazing straight ahead (or to the right) when the engine is curving rapidly to the left, and this continues year after year because, forsooth, the master-mechanic or other supervisor of runners thinks it not his province to tell intelligent engineers so minutely how to perform their duties. Trainmen know of this evil practice and see its consequences; why should not the superior make this knowledge his own and act upon it?

We may as well say in plain words that we are speaking now chiefly to directors and general managers. Superintendents and train-masters, as a rule, do everything in their power.

No man can be vigilant more than 24 hours in any one day. Mistaken economy hampers multitudes of active and progressive minds; hundreds of division offices to-day need additional executive power, which cannot be even thought of till the appropriation bill is forthcoming.

There are some minor points which should not be overlooked. The conductor testified at Tiffin that he took a red and [a] white lantern to signal the express train. Every train man has noticed that a white light close to a red one weakens its color materially and so impairs its value as a danger signal. Mony good superintendents say that runners should always lose time in severely cold weather; but this is a relative question. If the very fastest train slackens 10 per cent. or thereabouts, which is a common rule, it logically follows that the slower trains need not abate at all. Vice-President Smith, of the Baltimore & Ohio, is reported as claiming that there was no carelessness at Republic; but we forbear to criticise him; either he is mis-reported or else that was merely his way of kicking out the interviewer.

The question of heating apparatus and protection of trains from fire, which affects the Boston & Albany case equally with this, we will take up in a future number.

A German View of American Railroads.

Herr Leissner, a Prussian State Engineer, in a recent description of the American Railroad system in *Glarer's Annalen*, observes that to transplant the American style of rolling stock and mode of operating bodily to Germany would be a mistake, in view of the difference of climate and of manners and custom. The study of the American system, however, is very advantageous to German railroad men, not only on account of the lessons it may teach directly, but also because owing to the manner of its growth, it is unquestionably superior to the European system for countries where trade is to be developed through the agency of railroads, and where therefore cheapness is of greater importance than safety.

He notes the absolutely untrammelled development of the American system, aided in many cases by subsidies; the imperfect character of the first single track roads, and their gradual improvement in structure and way as traffic increased into roads like the Pennsylvania, ranking with the most perfect of European ones, but retaining in all cases the cheapness of the original construction in sharp curves and steep grades, and in most cases the bad condition and maintenance of their permanent way.

Herr Leissner asserts that the taste cultivated in Germany, and particularly in England, for reserve and household life, is entirely wanting in America. The American is always in a hurry. The superior consideration paid to women and the fondness of Americans for show are also mentioned by him in going over the peculiarities which have led to the peculiarities of the American railroad system. He mentions as an outgrowth of the former the fact that no special compartments for women are needed. He attributes our great uniformity of construction chiefly to the influence formerly exercised on railroads by the rolling stock manufacturers. This is rather wide of the mark, at least as to details where the influence of the factories led to a variety which is now being gradually eliminated by the master mechanics' and master car-builders' associations. He attributes our excellent rolling stock to the necessity of having a short fixed wheel base and great car length in order to cope with short curves and badly built track. He notes the annoyances of the constant rattling due to the magnificent lamps in the saloon cars which might be easily avoided with a little trouble. Also to the uncomfortable seats of our ordinary cars, a well-deserved reproach, which merits particular attention, since Mr. Forney has solved so ingeniously the problem of devising a comfortable reversing car seat. Herr Leissner seems to us somewhat biased by his European bringing-up in finding fault with the impossibility of lying down in the seats. He finds fault with some justice with our poor arrangements for hand baggage. The usual European arrangement is quite a wide shelf of open work, sloping to the wall of the compartment, and allowing a package of any size that can be squeezed in under the roof to be held securely. The cramped nature of our baggage nets is utterly unnecessary, and finds excuse only in the attempt of the companies to prevent the carrying of hand baggage. It only succeeds in making the passengers place their grips, etc., on the seats or floor, to the great inconvenience of their neighbors.

Herr Leissner raises an objection to the introduction of American rolling stock on the ground of the excessive angle which the long cars would produce in the buffers and the consequent danger with the side buffers of German vehicles. These side buffers are a very imperfect contrivance at best, introducing unnecessary transverse strains into the car frames and a dangerous tendency to derailment on curves even in the short European cars. They are as unmechanical as our off-set draw-gears.

We have given mainly Herr Leissner's criticisms on our railroads, omitting his appreciative notice of our good points of which he finds many. He comments among other things on the remarkable good nature and natural politeness of the traveling public here.

The plans for the Baltimore & Ohio bridge over the Arthur Kills will be materially changed if the report of the Engineer Commission to the Secretary of War be adopted. The plans of the company on which the act of Congress authorizing the building of the bridge was based called for a draw with 200 ft. clear opening, and for spans of 200 ft. on each side of the draw, the bridge to be 38 ft. above high water. The Engineer Commission on the other hand recommends that the eight of the bridge shall be not less than 50 ft., and that there shall be a single span 450 ft. long over the main channel, with a draw on the New Jersey side of the Kill having openings of 125 ft. clear. The engineers' report is based on the character of the tonnage passing through the Kill, which consists mainly of coal in canal boats, made up in large tows. These tows can be much better handled under the 450 ft. span than through a draw, and the steamers managing them can generally pass under a bridge 50 ft. high. The Secretary of War has as yet made no decision upon this report.

The extent to which railroads have superseded canals is shown by the report of the Chesapeake & Ohio Canal, published elsewhere. The managers of the canal represent that its business seems gone, and that the tows are no longer sufficient to pay for necessary repairs. The canal, they say, will have to be abandoned as a transportation line, unless state or national aid is furnished. It must be remembered, however, that the Chesapeake & Ohio Canal runs through a mountainous region, where it is constantly subject to damage from freshets. Its principal use is as a coal carrier from the Cumberland region, and for that traffic it has to compete with the Baltimore & Ohio and the Pennsylvania railroads. The James River & Kanawha Canal, the oldest artificial waterway of any length in the United States, which ran through a somewhat similar country, although it lacked the heavy coal traffic of the Chesapeake & Ohio, was abandoned some years ago, and its right of way used for a road-bed for a railroad.

Whatever opinion Mr. Franklin B. Gowen's friends and enemies may have of the correctness of his judgment, none of them can deny his courage and his habit of plain speaking. In a recent letter addressed to the owners of Philadelphia & Reading stock and bonds, he says:

"The reduced earnings of 1884, 1885, 1886—the value of the property is now unfairly gauged—are due entirely to the incapacity of the management of the Receivership. The dates between the death of Mr. Edwin B. Lewis, in August, 1884, and the accession of Mr. Austin Corbin, in October, 1886."

After this statement, no one can be in doubt as to Mr. Gowen's opinion of the Receivers.

We have received abstracts of the reports of the Railroad Commissioners of Illinois and of Nebraska. The former is almost entirely statistical; the latter discusses questions of public policy at considerable length.

The most noticeable fact in the Ilinois returns is the great aggregate reduction in operating expenses. The slight decrease in earnings was far more than covered by the decrease in expenses; the former being only two million dollars, the latter nine million. We shall await the detailed report with great interest, to see just where this saving has been made and whether it is a case of true or of false economy.

Nebraska is one of the five states where the gross earnings for 1885-6 were very much greater than those for 1884-5; the aggregate returns showing an increase of more than 10 per cent. It is perhaps for that reason that the question of enforced reductions in charge occupies so prominent a place in the Commissioners' report. By an act of 1881, a system of maximum rates was established, based upon the charges actually prevailing in the latter part of 1880. Although the 1880 rates were lower than those of previous years, the improvements in railroad economy have been such as to make still further reduction not merely possible, but actually advantageous to the companies themselves. They have thus voluntarily reduced their charges below what the act requires. Instead of serving as a check upon the railroads, the act of 1881 serves as a protection to them; for if any one complains of their charges, the companies answer that they are within the limits imposed by the law; and nothing more can be done by the complainant. The commissioners distinctly say that they would be glad to have the provision with regard to maximum rates repealed, and have the determination of what constitutes a reasonable rate left in the hands of the Commission and the courts.

Of still more general interest is that part of the report which bears on local discrimination. The act of 1881 has had the effect of preventing the companies from granting special rates to the localities which most need them. The commissioners say that such was probably not the intention of its framers; but it has had that practical effect. In the local traffic within the limits of Nebraska itself, this makes comparatively little difference; but there is grave apprehension of the results which would arise if it were applied to interstate commerce also. The report takes strong ground on this point. The Conference Bill had not been arranged when the report was written; but the commissioners "doubt the propriety of adopting the principle set forth in the fourth section of the Cullom Bill," which is distinctly milder and more conservative than the same section as reported by the conference committee, and they characterize the corresponding section of the Reagan Bill as "unwise and ill-advised."

We reserve a more detailed account of these reports until we shall have the full text at hand.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows:

Gainesville, Henrietta & Western.—Extended from Childress, Texas, westward 5 miles.

This is the first track reported for 1887, making a total of 5 miles for the year. The new track reported to the corresponding date for 16 years has been:

	Miles.		Miles.		Miles.		Miles
1887	5	1883	24	1879	..	1875	14
1886	8	1882	8	1878	..	1874	49
1885	5	1881	25	1877	..	1873	..
1884	4	1880	10	1876	16	1872	..

This statement covers *main track only*, second or other additional tracks and sidings not being counted. The weather at present is very unfavorable for tracklaying.

English Railroad Employes.

In accordance with an order of the House of Commons, the British Board of Trade has collected statistics of the number of employés of different kinds employed on each of the railroads of Great Britain and Ireland March 31 last, which will be found very interesting to American railroad men who desire to compare English railroad administration with our own. We give below a summary showing the totals of each class for the whole kingdom:

Secretary's Department:		
Secretaries	94	
Assistant secretaries	21	
Cashiers	55	
Clerks	954	
Other persons	227	
		1,351
Accountant's Department:		
Accountants	68	
Assistant Accountants	24	
Clerks	2,590	
Messenger and others	166	
		2,848
Legal and Parliamentary Departments		222
General Manager's Department:		
General managers	60	
Assistant general managers	16	
Clerks	608	
Other persons	97	
		781
Superintendent's Department:		
Superintendents	36	
Assistant Superintendents	16	
District superintendents	91	
Station-masters	6,165	
Clerks	10,013	
Inspectors	1,389	
Guards	5,902	
Signalmen and pointsmen*	19,012	
Ticket collectors	2,060	
Shunters,† porters and messengers	22 886	
Other persons	6,607	
		74,177

* In Scotland 1,791 signalmen to 573 pointsmen.
† In Scotland 136 shunters to 2,232 porters and messengers
In England 1,846 shunters to 16,578 porters and messengers.

Goods Managers' Department:		
Goods manager	29	
Assistant managers	13	
District managers	71	
Agents	862	
Clerks	16,196	
Inspectors	963	
Guards and brakemen	7,410	
Shunters	3,943	
Porters and messengers	21,241	
Other persons	18,985	
		69,713
Total traffic departments		144,671
Locomotive Department.		
Locomotive engineers	55	
District engineers	70	
Clerks	2,013	
Draughtsmen	248	
Foremen	1,729	
Mechanics and artisans	45,401	
Drivers	12,874	
Firemen	12,795	
Laborers and others	43,141	
		118,326
Engineers' Department.		
Engineers	68	
District engineers	133	
Draughtsmen	585	
Clerks	782	
Inspectors	1,166	
Foremen	1 177	
Gaugers	6,843	
Artisans and mechanics	10,539	
Platelayers	29 820	
Laborers and others	26,340	
Gate-keepers	1,605	
Other persons	1,551	
		80,609
Store-keepers' Department:		
Store-keepers	53	
Assistant store-keepers	52	
Clerks	514	
Porters	324	
Workmen	953	
Laborers and others	924	
		2,820
Police:		
Superintendents	14	
Inspectors	105	
Sergeants	96	
Policemen and detectives	1,566	
		1,781
Employed in—		
Telegraph service	3,754	
On steamboats, docks and piers	6,041	
Canals	1,963	
Hotels and refreshment rooms	2,518	
Miscellaneous	889	
		15,165
Grand total		367,793

The first difficulty of the American railroad man is to understand what is included under the different departments and what the duties of some of the officers and classes of employés may be. Many of the terms explains themselves, but not all.

It will be seen that while there is a "Secretary's Department" there is no Treasurer's Department. This is because the Secretary of an English railroad company performs the duties of Treasurer also and these, indeed, seem to be his chief duties. We see that they have a staff of cashiers, and the greatest of the companies has reported its subdivisions in its Secretary's Department—the Secretaryships proper, with a Secretary, Assistant Secretary, three secretaries to committees, 20 clerks, and 20 other persons; a Cashier's Department with one Chief Cashier, 8 district cashiers, 34 clerks, and one other person; and a "Transfer Department," with a Chief Registrar, 28 clerks, and one other person.

The Accounting Department is remarkable for the smallness of the force; for though there are less than 19,000 miles of railroad covered by the report, there are 92 different companies, the aggregate traffic is enormous, and the aggregate earnings last year were more than $340,000,000. The fact that hauls are short makes the number of transactions more numerous for a given amount of earnings; but doubtless the Clearing-House relieves the companies of an enormous amount of the work of accounting, while it is possibl[e]

that a large part of it also is done by the traffic department, and the superintendents and goods managers together employ no less than 26,209 clerks.

Foreign Railroad Notes.

The question of a city steam railroad (elevated) for Vienna is taking practical shape, concessions for a number of lines having been granted in December last.

The Arlberg Tunnel Railway is finding a source of profit in the fact that goods sent by it for shipment to the Mediterranean, escape the vexations incident to passing the Italian custom-house on the Gothard tunnel route.

The English "Railway Benevolent Institution" in its annual report for the year 1886 presents a gratifying statement of the decrease in the number of fatalities to its members (all of whom are railroad employés) during the last 15 years. Out of its large number of members (30,230 in 1872, increasing gradually to 85,632 in 1886) the number of injured remains substantially uniform, 1 in 36; but the killed numbered in 1886 only 1 in 674, against 1 in 377 in 1872.

The northernmost railroad of Russia was opened Oct. 28 last from Estermura, in Finland, two degrees south of the north polar circle *via* Garnda Karleby to Uleaborg, 260 miles. Uleaborg is 654 miles from St. Petersburg, 480 miles from Helsingfors, the capital of Finland. This road does not extend so far north as one Swedish railroad, if the extension of the Lulea-Gelivara line has been made as it was to be two years ago. Its northern terminus is in the Frigid Zone.

The battle is very active at present in Germany over the relative merits of vacuum and pressure brakes, and in the May meeting of the German Master Mechanics' Association the remarkable statement was made, quite contradicting the latest previous returns, that the English Board of Trade statistics for the last half of 1885 showed 706 failures to act on the part of the Westinghouse in 20,175,885 miles of running, while the vacuum made 282 failures in 32,583,868, being respectively 1 failure to 28,578 miles and 1 to 115,545.

[By statement of the Westinghouse people since the above, it appears that the returns included all delays due to brakes and were not solely failures to act. On failures to act the Westinghouse shows itself still much the superior of the others.—ED.]

The average mileage made in 1882 by freight and passenger cars in different European countries is given as follows in the International Railroad Statistics prepared under the auspices of the European Statistical Congress:

	Freight.	Pass.		Freight.	Pass.
Germany	9,769	20,708	Italy	9,555	21,784
Austria	11,243	20,414	Switzerland	6,911	13,206
Belgium	6,365	24,388	Russia	10,132	27,525
France	9,556	28,737	Holland	9,011	23,931

The greatest average service of freight cars (in Austria-Hungary) is at the rate of 36 miles per day; the smallest, in Belgium, at the rate of 20⅛ miles per day. In France a passanger car runs 92 miles per day on an average, in Switzerland, 42 miles. Belgium is a country of short hauls, between coal mines and iron works, etc., and this makes the loading and unloading take a greater part of the time. Shippers are always calling for more cars there. In Germany and Austria the payment for use of cars is a *per diem* charge plus a mileage charge, but there is not there anything like the interchange of traffic that there is here, and so very large a part of the lines are worked by the Prussian government that a very wide circulation of cars may take place without leaving the "home road."

It appears that Mr. Banderali, the engineer of motive power of the Northern Railroad of France, returned after his visit to this country an entire convert to an elevated railway system, and in an interview with the editor of the *Revue Industrielle* expressed great admiration for the New York system.

The editor observes: "We do not expect that elevated railroads on iron frames will ever be used in Paris. That would be simple, inexpensive and easy to erect. We need something monumental, with right of way, condemnations, tunnelling of streets, transformation of districts—in a word, something to set men of all trades at work. It is necessary that the lines of railway which already have their exterior circuit and their interior circuit must be able to pass their cars through the heart of the city. Our happiness will be complete when we see engines of 30 to 40 tons circulating between the eastern and western railway stations. An examination of the mode of operation of the N. Y. Elevated might bring us to more healthy ideas if we didn't live in an epoch when we appear to have lost common sense, and allow ourselves to be seduced by the theatrical side of enterprise without considering the financial outcome."

In the "Nationality and Railroad Policy" of the late Baron Von Weber, published in 1875, occurs the following passage, in which is recognized a truth which seems ignored in Europe even more than in this country.

"It cannot be denied that the rates of railroads from an impenetrable chaos, in which the worst forces of secrecy, discrimination, improper motives work without restraint, but in which, most of all, false logic has its domain. But, on the other hand, neither can it be denied that all attempts to purify, to organize and to systematize have had for their sole result to make this chaos still more chaotic. And this is not only because, as pessimist antagonists of the railroads claim, with only partial justice, because the obscurity of the system of rates is not unwelcome to many railroad managements, *but simply because it is no more possible to systematize railroad rates than the market prices of bread and meat.*

The utilization of railroads, whether government or private road a commercial operation, in which demand and supply, value in use and cost of production play just the same part as in every other commercial operation.

Now, since the cost of performing the transportation everywhere varies like the selling price of goods, the demand and supply of transportation, the infinite permutation of these values make any logical and universally just systematization of the rates *à priori* a labor of the Danaids.

THE SCRAP HEAP.

Railroad Refectory Rally.

Railroad Conductor—"Can't you do something for this passenger?"

Doctor—"Has he appeared sick long?"

"No; he got out and took meals at every lunch station we stopped at from San Francisco to Omaha."

"Humph! Hadn't he any provender with him?"

"I believe not. What do you think ails him?"

"Starvation."—*Omaha World.*

Terrible Times in Michigan.

The men on stalled trains out in Michigan spend their time trying to coax the wild geese to come down and lay eggs in the smoke-stack of the engine. In several instances the diet has been reduced to snowballs, and even the high-toned pastime of tobogganing has palled on an empty stomach. It has been called hard to go around Cape Horn in the dead of winter, but the solitude of Michigan on a January night, with eight feet of snow on a level and drifts that look like the Fifth Avenue Cathedral, is said to take the whole substance out of a man's nerve, and to leave him as limp and helpless as a female child.

The Gold of Boston State House Was in Her Hair.

"Tom," said the train boy to the Pullman car porter, "Tom, I'm losing my grip. You see that girl with the sunlight hair, counting telegraph poles down at the other end of the car? Well, I flung her 'Airy, Fairy Lillian,' by the Duchess. I thought she was from Troy, sure. Now Bill, the conductor, says she's on her way home to Boston. And I had Herbert Spencer's 'Social Statics' right in my hand when I sized her up wrong. That settles literature for to-day. Give me the apple basket."

He Never Watered His.

"I see that Gould is hot after Little Rock," said a dapper young speculator to a group of friends on the curb down in New street. "Now what will *you* have?" he went on to a tramp, who had just halted in front of him.

"Well, Guvnor," was the reply, "seein' it's you, if you'll just put a little rye with that little rock, we'll leave Gould out of the question, and consider the thing settled. I'm a dandy at a repartee, you observe, and a perfect cyclone on a free lunch. I've gone long on the Nypano without a nip, an' now I'm just passing the Plate for a Nickel. Is it worth it, gents? Thanks."

The Conductor Had Been There.

It was on the Hudson River Railroad. The train was called the "milk train," and was composed of several milk cars, a baggage car and the usual passenger coach. There was no smoking car, and as I regard a cigar and a railway journey inseparable—"linked" together, as it were—I said in a kindly tone to the conductor:

"Is there not some place on this train where I can go to enjoy a cigar? Have one, conductor?"

Now he did not tell me to go on the roof, nor did he tell me to go to Halifax, N. S. My offering him a cigar had touched him in his weakest spot, for into his *pocket* went the cigar, and with a gracious smile he assisted me into the baggage car.

Once there, I complimented Bill Nye's "baggage shatterer," and M. Quad's "gentle-minded brakeman," who were instantly brought over on my side by three-for-five cigars, which I invariably carry, especially for that purpose. The eyes of a railway official will shine just as brightly upon a five-center as upon a Henry Clay.

The train stopped at a small station and a number of brickmakers boarded it. From their appearance, they had evidently been having a "night of it." There being no smoking car they all entered the baggage car, and at once commenced to jest with and annoy one old fellow who was more intoxicated than the rest. Presently our broken-hearted conductor came in to collect his fares—or rather the company's fares. He went from one to another, and as each new fare was handed him he was warned against our old "boozy" friend.

When he reached the old fellow he was greeted with cries of "Put him off! He hain't got no money! Drop him! Put him off!"

The countenance of the old man was painful to behold, the picture of abject misery.

"No, I'll not put him off. You fellows just keep your clothes on. I'm runniu' this train," said the kind-hearted conductor. "Now, my man, where's your fare?"

Again the calls of "Put him off! Put him off!"

"Shut up!" cried the knight of the punch, in a voice of thunder.

It was intensely dramatic.

"The fac' o' it is, boss, I were out wi' th' bboys, there, an' we were a-drinkin' an' a-havin' a good time, an' I spent all me money—I hain't got nary a red. If ye'd only carry me to——"

And thus the poor fellow supplicated until he was quieted by the conductor, who, turning upon the fellow's comrades, said:

"Nice fellows you are, ain't you? Stick by him and drink with him until he has spent his wages and then want to see me 'set him off among the daisies.' No, he'll not get off. I'll pay his fare myself. I know just how it is to get out with a lot of whiskey leeches like you fellows. I've been there myself.'

An expression of triumph passed over the features of the old man, and with a majestic wave of his hand he said to his comrades:

"Yez kin all go to ——; the conducther's been there."—*Detroit Free Press.*

Fast Time.

The fastest time ever made on the Union Pacific system was that of the train chartered a few days since by C. J. Putnam, of the United States Secret Service. He wished to reach Fremont, Neb., from Omaha, a distance of 47 miles, in time to catch a certain passenger train leaving for the Black Hills. He got there in 48 minutes, and lost 2½ minutes in stoppages. The only thing to beat a locomotive is a toboggan, and that won't do a thing on an up grade.

Stealing Box Cars.

General Manager Stewart, of the Cincinnati, Washington & Baltimore line, is reported as saying that the New England roads are just about the worst in the country for keeping and using the cars of other lines. He tells of an instance when a tracer found a box car belonging to the Cincinnati, Lafayette & Chicago road away up in New Hampshire, being used as a warehouse by a keen-minded Yankee. It was loaded with mill feed, and the rural speculator would undoubtedly have retained it as a useful bit of real estate to bequeath to his heirs had not the relentless tracer chanced along at an inopportune moment and pitched out him and his feed without a single regret.

Chauncey M. Depew's After Dinner Speech.

A letter was lately received by Mr. Chauncey M. Depew, President of the New York Central, in which the writer stated that, having heard that Mr. Depew was considered the best after-dinner speaker in the country, and was always able to find words and sentiments suitable to any occasion, he should like to hear what sort of speech Mr. Depew would make after dining at the New York Central restaurant at the Utica depot. The captain of the "Pinafore" would be an appropriate orator at many railroad restaurants.

TECHNICAL.

Harden Hand Grenades.

The Chief Engineer of the Navy has reported in reference to the mixture used in these fire-extinguishers:

"Neither the liquid mixture nor the gas developed from it by heat is deleterious. They have no injurious effects on paper, wood or cloth of any description. The gas is not poisonous, and when mixed with atmospheric air, may be breathed with impunity by animals. The gases developed from the liquid by heat are the best that modern chemistry can furnish for the extinction of fire, which they accomplish, not only negatively by excluding atmospheric oxygen, but positively by direct antagonism."

The company announces that their grenades are now in use on 43 railroads, and that they have been uniformly successful in extinguishing incipient fires.

Signals and Switches.

The Union Switch & Signal Co., of Pittsburgh, has bought the patent rights, material and good will of the interlocking signal business hitherto carried on by the Pennsylvania Steel Co., of Steelton, Pa. The latter company has transferred to the former all existing contracts relating to the interlocking of signals, and all special tools and plant used specially for making signals and interlocking apparatus. These contracts will be carried out by the Union Switch & Signal Co.

The Pennsylvania Steel Co. will continue as usual the manufacture of frogs, switches and switch-stands, which is not interfered with by this arrangement.

The Union Switch & Signal Co. is transferring the works in Pittsburgh to the Westinghouse Electric Light Co., and has taken the premises of the old Swissvale Car Works, just outside the city limits of Pittsburgh. These works cover nine acres of ground and are connected by sidings with the main line of the Pennsylvania Railroad, and are very suitable for the business of signal making. The old buildings have been repaired and in some cases increased in height and reroofed. All the work will be done on the ground floor. The new works will be in full operation in a few weeks.

Sanding Rails by a Jet.

The system of throwing sand on the rails in front of the driving wheels by a jet of compressed air or steam has been found very successful on the Midland Railroad (England), and that company is about to extend its use, and is building 10 engines with a single pair of drivers in place of the four-coupled engines used on this road for many years past. The jet of sand will, it is expected from the results of experiments, be found to give sufficient adhesion. The cost of coupling rods and the large pair of hind drivers will thus be saved. The system, as applied to an ordinary American type engine, is also about to be tried on a prominent road in this country.

A New Buffalo Coal Trestle.

The Lackawanna has for a long time past suffered from an insufficiency of room for storing coal, despite the fact that the shipping trestles at the foot of Erie street have a very large capacity. For some sime past plans have been in preparation for an immense storage trestle at East Buffalo, and it is understood the contracts for its erection have already been let. Its exact location has not been fully decided upon, but it will very likely be built on land between the main tracks of the company and those of the Erie. The plans provide for a stocking trestles 1,500 ft. long, with four tracks, a tunnel of sufficient width for two tracks being sunk into the ground. This will be 12 ft. high, and the walls will be of solid masonry. Both trestle and tunnel will be operated by gravity, making it one of the best of its kind in the country. Gates will be built at intervals along the tunnel, so that the cars may be loaded for shipment. Work is to begin inside of a month or two, and construction pushed so that it can be ready for use before the middle of summer.—*Buffalo Express.*

[Railroad Weather Signals.

The Chicago & Grand Trunk and the Detroit, Grand Haven & Milwaukee roads have adopted the system of United States weather signals, and are now carrying them on their local day trains. The flags are four in number and the signals are such as to denote every change in the weather.

An English Bridge Letting.

The Great Western Railway Co., England, invites contract bids for the manufacture of the steel superstructure for the central span of the Landore Viaduct, Swansea, England, and for its erection in place. Particulars may be obtained by addressing the Engineer at Paddington Station, London. Tenders to J. D. Higgins, Secretary, Paddington Station.

Car Couplers.

The Boston Automatic Car Coupler Co. has an order for 24 couplers to be put in service for test on the Chicago & Northwestern Railway on or about Jan. 25.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Connecticut River, annual meeting, at the office in Springfield, Mass., Jan. 19.

Illinois Central, special meeting, at the office in Chicago, Jan. 18.

Lehigh Valley, annual meeting, at the office in Philadelphia, at noon on Jan. 18.

Providence & Worcester, annual meeting, at the office in Providence, R. I., at 10 a. m. on Feb. 7.

St. Joseph & Grand Island, special meeting at Elwood, Kan., Jan. 26.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Little Schuylkill, 3½ per cent., semi-annual, payable Jan. 8.

Mine Hill & Schuylkill Haven, 3½ per cent., semi-annual, payable Jan. 15.

Mt. Carbon & Port Carbon, 6 per cent., payable Jan. 13.

Rutland, 0¾ per cent., semi-annual, on the preferred stock, payable Feb. 1.

Schuylkill Valley, 2½ per cent., semi-annual, payable Jan. 13.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* will hold its annual meeting at the Society's House in New York, beginning on Wednesday, Jan. 19.

The *Master Car-Builders' Club* holds its regular meetings at the rooms, No. 113 Liberty street, New York, on the third Thursday in each month.

The *New England Railroad Club* holds its regular meetings at its rooms in the Boston & Albany passenger station in Boston, on the second Wednesday of each month.

The *Western Railway Club* holds its regular meetings at its rooms in Chicago on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

Brake Committee Meeting.

Mr. G. W. Rhodes, Chairman of the Committee, issues the following circular, under date of Jan. 7:

"A joint meeting of the M. C. B. Brake Committee and the representatives of brake companies intending to participate in the April, 1887, tests, will be held at Pittsburgh at 10 o'clock a. m., Wednesday, Feb. 9, at the Hotel Anderson

"The rules governing the tests will be decided on at this meeting. A full attendance is requested."

Master Car-Builders' Club.

A business and social meeting of the Master Car-Builders' Club will be held at No. 113 Liberty street, New York, Jan. 20, 1887, at 8 o'clock p. m.

Subject for discussion: AUTOMATIC COUPLERS FOR FREIGHT CARS.

This meeting is called for a discussion of the situation as regards the action now being taken by railroads and state legislatures respecting the application of automatic couplings to freight cars, and the very important question that must soon be decided, namely, which style of draw-bar is the least liable to injure employés and prove the most economical for railroad companies to adopt, the VERTICAL HOOK or the LINK AND PIN.

In addition to the above, we wish an expression of opinion from railroad men, upon a matter that has until of late been about all on one side, namely, can a locomotive start and draw more cars with loose than with tight couplings?

Those unable to attend the meeting are earnestly requested to write their opinion on this matter.

American Society of Civil Engineers.

The following circular has been issued by the Committee of Arrangements, consisting of Messrs. J. James R. Croes, Wm. H. Wiley, Warren E. Hill and John Bogart:

The annual meeting of the Society will be held Jan. 19 and 20, 1887, at the Society's House, New York.

Wednesday, Jan. 19.—The meeting will open at 10 o'clock, and will continue through the day and probably during the evening. Lunch will be served at the Society's House at 13.30 o'clock.

During the meeting the annual reports will be presented; officers for the ensuing year elected; the awards of the Norman medal and of the Rowland prize for the past year announced: the place for the next convention considered; reports from various committees presented and discussed; technical subjects discussed; in connection with the subject of tests of structural materials, Mr. Charles Macdonald will describe a 600-ton testing machine recently erected; general business will be transacted.

Thursday, Jan. 20.—The arrangements for this day will be announced in detail at or soon before the meeting. They are in general as follows: A visit to the new railroad drawbridge over the Harlem River at Second avenue:—An inspection of and trip over the line of the Suburban Rapid Transit Railroad; thence by steamboat to Greenpoint, where a visit will be made to the Continental Iron Works. Lunch will be served in the offices of these works; thence by steamer to the Statue of Liberty Enlightening the World; thence return to New York.

In the evening a reception for gentlemen will be held at the House of the Society, and at 21.30 o'clock supper will be served in the library.

ELECTIONS AND APPOINTMENTS.

Baltimore & Harrisburg.—At the annual meeting, Jan. 3, the following were elected: President, A. W. Eichelberger, Hanover, Pa. Directors, Wm. Grumbine, Stephen Keefer, R. M. Wirt, Reuben Young, Hanover, Pa.; David Wills, Gettysburg, Pa.; Jerome L. Boyer, Reading, Pa.; J. M. Hood, Wm. S. Rayner, Charles W. Slagle, Wm. H. Vickery, Baltimore.

Bellaire, Zanesville & Cincinnati.—Mr. T. M. Hobart has been appointed Auditor of this company in place of J. M. Miller, who has been made General Freight and Passenger Agent, with headquarters at Zanesville, Ohio.

Big Level & Kinzua.—The following officers have been elected: Elisha K. Kane, President; D. T. Hall, Secretary; J. D. Brooder, Treasurer. Offices at Kane, Pa.

Boston & Albany.—E. L. Sackett, formerly Train Dispatcher at West Springfield, Mass., is promoted to be Superintendent of the Springfield Division of this road, which extends from Worcester to Pittsfield, and includes the Athol and Ware River branches. By this promotion, Frank T. Bissell becomes Day Dispatcher at West Springfield and Mr. J. Burke Night Dispatcher.

Bradford, Bordell & Kinzua.—The directors chosen Jan. 10 are: G. Clinton Gardner, C. H. Allen, A. N. Martin, B. K. Jamison, C. H. Clark, I. N. Seligman, E. W. Clark.

Bradford, Eldred & Cuba.—At the anaual meeting, held at Eldred, Pa., the Board of Directors chosen was as follows: C. Clinton Gardner, C. H. Allen, A. N. Martin, B. K. Jamison, C. H. Clark, I. N. Seligman and E. W. Clark.

Bristol & Elizabethtown.—The officers of this new company are: President, Joseph R. Anderson, Bristol, Tenn.; Vice President, W. D. Jones, Philadelphia; Secretary, G. A. Blackmore, New York; Treasurer, Jonas Wilder.

Buffalo, New York & Philadelphia.—At the annual meeting in Philadelphia, Jan. 10, the following were elected: President, G. Clinton Gardner; directors, C. H. Clark, B. K. Jamison, E. W. Clark, Joseph S. Harris, Isaac N. Seligman, E. F. Winslow, A. N. Martin, C. H. Allen, Bryce Gray, E. L. Owen, B. C. Rumsey, P. P. Pratt.

Mr. A. J. Warwick, late of the Globe line, has accepted a position in the Auditor's department of this road.

Burlington, Cedar Rapids & Northern.—Mr. C. D. Ives has been appointed Assistant General Freight Agent of this road, with office at Cedar Rapids, Iowa.

Canadian Pacific.—Mr. Lucius Tuttle has been appointed Passenger Traffic Manager of all the lines of this company. General Passenger Agents of divisions will report to him at Montreal.

Central, of New Jersey.—John S. Kennedy and Joseph S. Harris, Receivers, have issued the following circular: "In accordance with the decree of the United States Court, the undersigned Receivers of the Central Railroad Co. of New Jersey will take possession of the Central Railroad of New Jersey, with its branches and leased lines, and of all property appertaining thereto, on the first day of January, 1887. S. M. Williams has been appointed Secretary to the Receivers and Comptroller. J. W. Watson has been appointed Treasurer for the Receivers. J. H. Olhausen has been appointed General Superintendent. His office will be at Elizabeth, N. J. P. H. Wyckoff has been appointed General Freight Agent. H. P. Baldwin has been appointed General Passenger Agent. W. W. Stearns has been appointed Superintendent of the New Jersey Central Division, and also of the ferries and boats connected therewith. His office will be at Elizabeth, N. J. W. V. Clark has been appointed Superintendent of the New Jersey Southern Division. His office will be at Long Branch, N. J. G. W. Twining has been appointed Superintendent of the Lehigh & Susquehanna Division. His office will be at Mauch Chunk, Pa. W. H. Peddle has been appointed Engineer of the New Jersey Central and New Jersey Southern divisions. He will have charge of the maintenance of the roadway of all the lines in New Jersey, including buildings, stations, piers, bridges, docks and other structures. His office will be at Elizabeth, N. J. J. H. Thompson has been appointed Engineer of the Lehigh & Susquehanna Division. He will have charge of the maintenance of the roadway on all the lines in Pennsylvania, including buildings, stations, bridges and other structures. His office will be at Mauch Chunk, Pa. T. B. Koons has been appointed Freight Agent of the Lehigh & Susquehanna Division. His office will be at Mauch Chunk, Pa. W. F. True has been appointed Freight Agent of the New Jersey Southern Division. His office will be at Long Branch, N. J. A. Reckless has been appointed Purchasing Agent. G. O. Waterman has been appointed Auditor of Receipts and Disbursements. He will report to the Comptroller. George Wolf has been appointed Auditor of Passenger Traffic. He will report to the Comptroller. G. H. Sanborn has been appointed Auditor of Freight Traffic. He will report to the Comptroller. M. A. Koons has been appointed Coal Traffic Accountant. He will report to the Comptroller. H. W. Douty has been appointed Real Estate Agent. He will be responsible for the real estate of the company. He will have charge of the accounts relating thereto, subject to the directions of the Comptroller. He will collect all the rentals due from the tenants of the company, and will remit all moneys received subject to the directions of the Treasurer. He will attend to the details of taxation in connection with the real estate, subject to the directions of the General Attorney. Frank E. Higbie has been appointed Car Accountant. He will report to the Comptroller. His office will be at Elizabeth, N. J. Except as otherwise designated, the offices of the foregoing officials will be at No. 119 Liberty street, New York."

Central Vermont.—Mr. Geo. Cassidy has been made Assistant-Superintendent of local freight traffic, with office at St. Albans, Vt.

Chartiers & Youghiogheny.—At the annual meeting in Pittsburgh, Jan. 10, the following were elected: President, J. E. Swartz; Directors, Jacob Henrici, Henry Hice, Edward Gregg, O. P. Scaife, John Reese, George S. Griscom, John G. McConnell, J. H. Ferguson, Thomas McConnell and Robert Wardrop.

Chesapeake & Ohio Canal.—At the annual meeting of stockholders held at Annapolis, Md., Col. L. Victor Baughman was re-elected President, and the old Board of Directors, comprising Col. J. G. Berret, John Humbird, P. Hamill, Spencer Watkins, Robert A. Dobbin and Clinton G. Paine were continued in office.

Chicago, Fort Scott & Texas.—The officers of the corporation are to be: H. A. Harris, President; Henry C. Comegys, Vice-President; C. H. Malin, Secretary, and J. H. Dowland, Treasurer. Directors: Rowland N. Hazard, Alexander G. Black, New York; Henry C. Comegys, A. A. Harris, C. H. Malin, J. H. Dowland, U. B. Pearsall, J. H. Crain, Fort Scott, Kan.; T. J. Leonard, Girard, Kansas.

Chicago & Grand Trunk.—Mr. Thomas Tandy has succeeded Mr. Porteous, transferred, as General Freight Agent for this line at Montreal.

Mr. J. W. Loud, for many years the Freight Agent of this line at Toronto, has succeeded Mr. Tandy, at Detroit.

Chicago, St. Paul, Minneapolis & Omaha.—Mr. J. S. McCullough, late Chief Clerk, has been appointed Assistant General Passenger Agent

Cleveland & Canton.—At a meeting of the Blood party of stockholders of this road, held last week at Canton, O., the old board was re-elected as follows: H. A. Blood, Wm. J. Rotch, W. O. Chapman, Wm. Rotch, G. N. Smalley, John W. Wardwell, Nathan D. Freeman, Isaac H. Taylor, Samuel Alle, A. Emery, Seth T. Paine, Wm. H. Bell, John C. Allen, H. C. Ranney and E. T. Blood.

Cleveland, Columbus, Cincinnati & Indianapolis.—Mr. J. W. Hewitt has been appointed Assistant Travelling Auditor of this and associate roads, with headquarters at Cleveland.

Cleveland, Youngstown & Pittsburgh.—At the annual meeting in Pittsburgh, Jan. 10, the following were elected: President, J. E. Schwartz; Directors, Jacob Henrici, Henry Hice, John Reeves, F. M. Love, B. F. Wilson, Edward Gregg, D. H. Stowe, O. P. Scaife, John G. McConnell, Wm. A. Robinson and William Miller.

Cincinnati Railroad Association.—Mr. W. J. Hayes has been appointed Joint Car Inspector by this association.

Colorado Midland.—Mr. B. H. Bryant has been appointed Assistant Chief Engineer of this road, with headquarters at Colorado Springs, Col.

Columbus & Eastern.—Mr. H. O. Pond has been appointed Master of Transportation of this road. Heretofore he has been the Chief Train Dispatcher of the Toledo Division of the Columbus, Hocking Valley & Toledo.

Columbus, Hocking Valley & Toledo.—The election held in Columbus, Ohio, resulted in the retirement of all the old directors with the exception of W. M. Green. The new board was made up as follows: D. W. Caldwell and J. Newell, Cleveland, O.; Charles Crocker, H. L. Terrell, New York; Jay O. Moss, Sandusky, O.; J. W. Shaw, New York; William M. Green, Columbus, O. The directors elected these officers: President, James W. Shaw, New York; Vice-President and General Manager, William M. Green, Columbus, O.; Secretary, William P. Shaw, New York; Treasurer, William N. Cott, Columbus, O. The directors retired were: Judge Stevenson Burke, Charles Hickox, W. J. McKinnie, Charles G. Hickox, Cleveland, O.; J. L. Humphreville, New York; C. H. Andrews, Youngstown.

Coudersport & Port Allegheny.—At the annual election of this company at Coudersport, Pa., the old officers and board of directors were elected as follows: President, F. W. Knox, Coudersport, Pa.; Vice-President, C. S. Cary, Olean, N. Y.; Treasurer, M. W. Barse, Olean; Superintendent, B. A. McClure, Coudersport; Secretary, A. B. Mann, Coudersport; C. S. Cary, Olean; F. H. Root, Buffalo; A. G. Olmsted, Isaac Benson and J. L. Knox, Coudersport; B. D. Hamlin, Smethport, Pa.; F. H. Arnold, Port Allegheny, Pa.

Cresson, Clearfield & New York.—At the annual meeting, Jan. 10, the following officers were elected: President, James S. Atterburg; Vice-President, John S. Boyts; Secretary and Treasurer, George J. Gerrman; Directors: George J. Gerrman, Edward F. Earle, William R. Thompson, Peter Jurling, Edward Scull, Somerset, Pa.; Charles E. Pugh, Philadelphia; John S. Silver, New York; John S. Blaine, Philadelphia; Anthony S. Morrow, Hollidaysburg, Pa., and B. F. Boyts, Connellsville, Pa.

Dayton & Ironton.—President, Mr. Francis B. Loomis; Vice-President, Mr. Ezra Gildersleeve; Secretary and Treasurer, Mr. W. C. Boone. Offices at 96 Broadway, N. Y. Address ticket and mileage reports to N. P. Ramsey, Auditor; send car tracers to R. B. Wisel, Car Accountant; remittances for balances should be made to J. E. Gimperling, Cashier, office at Dayton, O.

Denton & Weston.—City Engineer King, of Fort Worth, Tex., has been appointed Chief Engineer of this new road.

Denver & Rio Grande.—Mr. R. F. Weitbrec is now assistant to the President of this company, with office at Denver, Col.

Denver & Scranton.—The officers of this company are as follows: G. W. Swallows, President; Assyria Hall, Vice-President and Superintendent; Stetson Leach, Treasurer; G. W. Edwards, Secretary and Auditor. General offices, Denver, Col.

Erie & Pittsburgh.—At the annual meeting in Erie, Jan. 10, the following directors were chosen: George B. Roberts, Philadelphia; Sidney E. Fairchild, Cazenovia, N. Y.; Wm. L. Scott, William Brewster, Charles H. Strong, M. H. Taylor and Joseph McCarter, Erie, Pa.; William L. Scott was elected President, Joseph McCarter, Vice-President; William Brewster, Secretary and Treasurer.

Fitchburg.—Mr. John Whitmore, Traffic Manager of this company, will hereafter have the title of General Traffic Manager, with general charge of all the company's traffic.

Fort Worth & New Orleans.—The following directors have been elected: Charles Dillingham, A. H. Swanson, E. W. Cove and L. A. Haffin, of Texas; and Frank H. Devis, Edward H. Partee and George E. Neils, of New York. Charles Dillingham was elected President; A. H. Swanson, Vice-President; and F. W. Cove, Secretary and Treasurer.

Jamesville & Washington.—Edwin A. Gaskell is President of this company; James McManus, Vice-President; H. T. Fenton, Secretary; James Work, Treasurer. Offices in Philadelphia.

Kansas City, Memphis & Birmingham.—Mr. R. H. Elliott, Assistant Chief Engineer of the Louisville, New Orleans &, Texas, is the successor of John A. Grant, Chief Engineer of this road, the latter having resigned the position.

Kendall & Eldred.—The directors chosen Jan. 10 are: G. Clinton Gardner, C. H. Allen, A. N. Martin, B. K. Jamison, C. H. Clark, I. N. Seligman, E. W. Clark.

Lake Shore & Michigan Southern.—Mr. Geo. C. Greene, of Buffalo, has been appointed General Counsel of this company in place of Mr. Ashley Pond, resigned. Mr. Greene's headquarters are at Buffalo, N. Y.

Lehigh Coal & Navigation Co.—At the annual meeting in Philadelphia, Jan. 10, the following were elected: President, F. C. Yarnall; directors, J. S. Harris, E. W. Clark, Edward Lewis, T. C. Henry, E. Hill, C. F. Powell.

The leased lines of this company elected officers as below: *Lehigh & Lackawanna.*—President, F. C. Yarnall. *Nesquehoning.*—President, J. B. Woodbeck. *Wind Gap & Delaware.*—President, F. C. Yarnall. *Wilkes-Barre & Scranton.*—President, J. S. Harris.

Lehigh Valley leased lines.—At the annual meetings in Philadelphia, Jan. 10, officers were elected as follows: *Loyalsock.*—President, E. P. Wilbur. *Pennsylvania & New York.*—President, E. P. Wilbur; Vice-President, Charles Hartshorne; Second Vice-President, Robert H. Sayre; Secretary and Treasurer, Wm. C. Alderson.

Louisiana, Arkansas & Missouri.—Mr. A. W. Soper has been elected President of this newly organized company.

Louisville, New Albany & Chicago.—Mr. Ferdinand Hall has been made Chief Engineer of this road, with headquarters at Chicago.

McKean & Buffalo.—At the annual meeting of this company, held at Smethport, Pa., Jan. 10, the following directors were chosen: G. Clinton Gardner, C. H. Allen, A. N. Martin, B. K. Jamison, C. H. Clark, I. N. Seligman, E. W. Clark.

Milwaukee & Michigan Fast Freight.—Mr. David Brown, Assistant General Freight Agent of the Detroit, Grand Haven & Milwaukee, has been made Manager of this line.

Minneapolis, Sault Ste. Marie & Atlantic.—Mr. Fred D. Underwood, General Manager of the Minneapolis & Pacific, has also been given the same position with this road. Mr. W. W. Rich, the present Chief Engineer of this road, has also been appointed Chief Engineer of the Minneapolis & Pacific.

Missouri Pacific.—The appointment is officially announced of Mr. J. W. Dickinson as Assistant Superintendent of the Missouri, Kansas & Texas Division, Texas lines, of this system, and also of the Taylor, Bastrop & Houston road. His headquarters will be at Denison, Tex.

Mobile & Ohio.—The following circular has been issued by Vice-President and General Manager Talcott: "Mr. Thomas J. Whitehead has been appointed General Agent of this company to take effect Jan. 1, 1887. His headquarters will be at St. Louis, Mo., and he will have jurisdiction in such matters pertaining to freight traffic and over such territory as the Traffic Manager may, from time to time, prescribe.

"From and after Jan. 1, 1887, there will be two masters of trains on the St. Louis Division, with offices in East St. Louis and Cairo, respectively.

"Mr. J. P. Meredith has been appointed Master of Trains with headquarters at East St. Louis, and will, under the Superintendent, direct the movement of all trains over the St. Louis & Cairo Railroad, in accordance with the time-table and rules of the company, and will be responsible for the proper conduct of the transportation service and the discipline of employés connected therewith.

"Mr. J. W. Ravlin, Master of Trains, will, as heretofore, direct the movement of all trains between Cairo and Corinth, in accordance with the time-table and rules of the company, and will be responsible for the proper conduct of the transportation service and the discipline of employés connected therewith."

Montana Union.—The following changes and appointments are announced by President and General Manager Dana: Mr. J. E. Dawson, Superintendent, vice Mr. Chas. Blackwell, resigned; Mr. S. B. Calderhead, Agent, Butte Station, vice Mr. Dawson, appointed Superintendent; office, Butte, Mont.

New York City & Northern.—At the annual meeting of this company, held in New York, the following directors were elected: Robert M. Galloway, Robert C. Livingston, A. M. Billings, John M. Randell, George J. Forrest, William S. Hollister, Henry K. McHarg, Henry F. Dimmock, George F. Stone, John J. McCook, George S. Lespinasse, Joseph S. Stout, John I. Waterbury.

New York District.—At the meeting in New York this week the following directors were elected: J. Coleman Drayton, William A. Street, Rowland R. Hazard, David Paton, W. Barclay Parsons, Jr., Calvin Goddard, L. W. Winchester, George B. Post, Sherburne B. Eaton, David H. Bates, R. W. Stevenson, Elisha Dyer, 3d, and R. W. Blackwell.

New York, Lake Erie & Western.—Conductor John Staples has been appointed Train Master of the Eastern Division of this road.

Norwich & Worcester.—At the annual meeting, Jan. 12, the old board was re-elected, and subsequently elected F. H. Dewey President; Edward T. Clapp, Secretary; George L. Perkins, Treasurer.

Ohio & Mississippi.—Mr. Edward P. Cutter, for some time past Auditor of this company, has been chosen Secretary also.

Olean, Bradford & Warren.—These are the directors chosen Jan. 10: G. Clinton Gardner, C. H. Allen, A. N. Martin, B. K. Jamison, C. H. Clark, I. N. Seligman, E. W. Clark.

Paris & Great Northern.—At the annual election held in Paris, Tex., the following directors were chosen: John O'Day, C. W. Rogers, Jas. Dun, and Alex. Douglass, of St. Louis; S. J. Wright, W. V. Hale, C. D. Purdon, John Martin, J. C. Gibbons, of Texas.

Pennsylvania Railroad leased lines.—At the annual meetings in Philadelphia, Jan. 10, officers were elected as follows: *Martin's Creek.*—President, J. N. DuBarry. *Newry.*—President, Joseph Fichtner. *Philadelphia, Germantown & Chestnut Hill.*—President, Henry D. Welsh. *Ridgway & Clearfield.*—President, J. N. DuBarry. *Susquehanna & Clearfield.*—President, J. N. DuBarry.

Peoria Terminal.—The officers of this company are as follows: D. P. Phelps, President, Monmouth, Ill.; Russell Sage, Vice-President, New York; J. R. Hanna, Secretary; Wm. Hanna, Treasurer; Alfred Sully, Transfer Agent, 115 Broadway, New York; J. F. Wallace, Chief Engineer. General offices, Monmouth, Ill.

Petersburg.—At a meeting held in Baltimore last week, Col. John B. Palmer was elected President of this company in place of Mr. B. F. Newcomer, resigned.

Philadelphia & Reading.—At the annual meeting in Philadelphia, Jan 10, the following were unanimously elected: President, Austin Corbin; Managers, I. V. Williamson, John Wanamaker, A. J. Antelo, Peter C. Hollis, Samuel R. Shipley, Thomas Cochran; Treasurer, William A. Church; Secretary, William R. Taylor. Messrs. Shipley and Cochran are new directors, succeeding David Hostetter and Mark Watson.

Mr. A. A. McLeod has been made General Manager of this company.

The leased lines held their meetings the same day and elected officers as below: *Allentown.*—President, Austin Corbin; Secretary, Howard Hancock; Treasurer, John Welch. *Chester & Delaware River.*—The same officers. *Danville & Shamokin.*—The same officers. *East Mahoney.*—The same officers. *East Pennsylvania.*—The same officers. *Northeast Pennsylvania.*—President, Joshua Comly; Secretary, J. S. Wise. *North Pennsylvania.*—President, Franklin A. Comly; directors, John Jordan, Jr., William C. Ludwig, Edward C. Knight, Alfred Hunt, Ario Pardee, James H. Stevenson, Richard J. Dobbins, Charles A. Sparks, Edwin H. Fitler, Thomas P. Stotesbury, Thomas Cochran, Thomas McKean; Secretary, J. S. Wise. *Reading & Columbia.*—President, Austin Corbin; Secretary, Howard Hancock; Treasurer, John Welch. *Shamokin, Sunbury & Lewisburg.*—President, S. P. Wolverton; Secretary, Howard Hancock; Treasurer, John Welch. *Schuylkill River West Side.*—The same officers.

Philadelphia, Wilmington & Baltimore.—At the annual meeting in Wilmington, Del., Jan. 10, the following directors were chosen: Isaac Hinckley, S. M. Felton, Jacob Tome, Charles Warner, William Sellers, Christian Febiger, George B. Roberts, Frank Thomson, John P. Green, J. N. DuBarry, Edmund Smith, Wistar Morris, Benjamin F. Newcomer, Edward Lloyd and Skipwith Wilmer.

The leased *Philadelphia & Baltimore Central* elected Isaac Hinckley, President; Alfred Craven, Secretary and Treasurer.

Pittsburgh, Fort Wayne & Chicago.—Judges McKennan and Acheson, of the United States Court at Pittsburgh, have appointed Gen. Geo. W. Cass trustee of the first, second and third mortgages of this company, in place of the late Samuel J. Tilden.

Pittsburgh & Lake Erie.—At the annual meeting in Pittsburgh, Jan. 10, the following were elected: President, John Newell; Directors, Cornelius Vanderbilt, William K. Vanderbilt, Hamilton McK. Twombly, David Hostetter, James I. Bennett, M. W. Watson, James H. Baily, Robert Dupuy, A. E. W. Painter, James M. Schoonmaker, Henry Hice, D. Leet Wilson.

Pittsburgh & Western.—At the annual meeting in Pittsburgh, Jan. 10, the following were elected: President, James Callery; Directors, James Callery, Solon Humphreys, John W. Chalfant, M. K. Moorhead, T. M. King, A. M. Marshall, Robert Garrett, James B. Oliver, John W. Terry, Samuel Spencer, John K. Cowen, Wm. Semple and N. S. Hill.

Mr. B. J. Hamm has been appointed Car Service Agent of this and leased lines (comprising the Pittsburg & Western, Pittsburgh, Cleveland & Toledo and Pittsburgh & Fairport) also the Pittsburgh & Toledo Dispatch. All correspondence should be addressed to Mr. Hamm at Alleghany, Pa.

Poughkeepsie Bridge Co.—The annual meeting was held in New York last week, and the new board of officers elected are as follows: President, Watson Van Benthuysen, of New Orleans, La.; Directors: Henry C. Gibson, Isaiah V. Williamson, Andrew M. Moore, Col. Morton McMichael, all of Philadelphia; Arthur Brock, Lebanon, Pa.; Henry McCormack, Harrisburg, Pa.; P. W. Gallaudet, J. Coleman Drayton, S. W. Knevals, all of New York; John J. Platt and Edward Ellsworth, of Poughkeepsie, N. Y.; and J. H. Appleton, of Holyoke, Mass.

St. Louis, Arkansas & Texas.—Mr. J. F. Hinckley has been appointed Chief Engineer of this line and its branches, with headquarters at Texarkana, Tex.

St. Louis, Vandalia & Terre Haute—At the annual meeting held this week in St. Louis the old board of directors was re-elected.

St. Paul, Minneapolis & Manitoba.—Mr. Joseph Bookwalter has been appointed Land Commissioner of this road.

Salina, Columbus & Southeastern.—The officers of this road are: President, Hon. W. B. Stone, Galena, Kan.; Vice-President, C. H. Blair, New York; Treasurer, R. A. Long, Columbus, Kan.; Secretary, Col. J. R. Hallowell, Wichita, Kan.; General Manager, E. A. Crewson, Columbus, Kan. Directors: Hon. W. B. Stone, C. H. Blair, Col. J. R. Hallowell, R. A. Long and E. A. Crewson.

Syracuse & Baldwinsville.—At the annual meeting held last week at Baldwinsville, N. Y., the following officers and directors were elected: President, J. T. Skinner: Vice-President, Wallace Tappan; Treasurer, P. K. Green; Secretary, W. W. Downer; Manager, Alexander Hamill; Executive Committee, J. T. Skinner, F. C. Hollins, P. K. Green; directors, J. T. Skinner, A. Hamill, Wallace Tappan, Jacob Amos, James Frazee, W. F. Morris, A. T. Hotailing, W. W. Downer, of Baldwinsville, N. Y.; P. B. McLennan, Syracuse, N. Y.; D. L. Wing, Springfield, Ill.; F. C. Hollins, R. W. Johnson, New York; P. K. Green, Jersey City.

Topeka & Southern.—The incorporators are: James Hill, J. T. Henry, Frank J. Hess, and W. M. Jenkins, of Arkansas City, Kan.; George M. Miller, and James Scoudratt, Wellington, Kan.; Charles L. Barry, and C. A. Mitchell, of Cherry Vale, Kan.; Allen C. Kirby, of St. Louis.

Union Pacific.—Mr. J. W. Griffith has been appointed Auditor of Disbursement of this company. Address all reports and correspondence to him at Omaha, Nebraska.

Versailles & Midway.—The officers of this company are as follows: W. H. Graddy, President; Thos. H. Hays, Vice-President and General Manager; Robert Wallace, Superintendent and Secretary; John R. Pates, General Agent; A. B. Rich, Master Mechanic; Jas. Duffy, Roadmaster. The offices of the company are at Versailles, Ky.

Vicksburg & Meridian.—Mr. H. F. Clark is appointed Superintendent, with office at Vicksburg, Miss., in place of Mr. M. S. Belknap, resigned. Mr. Clark was recently on the Wabash road, and is an old and experienced railroad man.

Vicksburg, Shreveport & Pacific.—Mr. H. F. Clark has been appointed Superintendent, with office at Vicksburg, Miss., in place of Mr. M. S. Belknap, resigned.

Wabash, St. Louis & Pacific.—Receiver Cooley has issued two general orders. The first one directs that from and after Sunday, Jan. 9, all agents and conductors who may receive moneys to be accounted for to the Receiver, whether on freight or passenger traffic, or on any other account, will, instead of remitting as formerly to St. Louis, or, as now, to the Receiver in person, remit daily to the Commercial National Bank of Chicago on forms and in inclosures which will be supplied to them for the purpose.

The second order announces the organization of the road as follows: "The following appointments have been made by the Receiver, and the persons named are now in possession of their offices, respectively, and will be respected and obeyed by all subordinates and agents in their several departments: Kirtland H. Wade, General Superintendent; George W. Stevens, Assistant General Superintendent; William B. Corneau, Treasurer; Morris Trumbull, Auditor; Milton Knight, General Freight Agent; Samuel W. Snow, General Passenger Agent; Thomas C. Moore, General Agent for the Receiver; Richard J. Reese, Purchasing Agent; J. B. Barnes, Superintendent of Motive Power; M. M. Martin, Superintendent of Car Department. The headquarters of the Assistant General Superintendent and the Superintendent of Car Department will be at Decatur, Ill.; that of the Superintendent of Motive Power and Machinery at Springfield, Ill.; that of all other officers named will be at Chicago."

Wheeling & Lake Erie.—Mr. Walter R. Woodford has been appointed Assistant General Manager of this road. N. A. Somers is appointed Master of Transportation.

PERSONAL.

—Mr. Jay Gould has gone to Texas to look after the interests of the Missouri Pacific.

—Mr. M. S. Belknap has resigned his position as Superintendent of the Vicksburg & Meridian and the Vicksburg Shreveport & Pacific roads, to date from Jan. 1.

—Mr. Grinnell Burt, President of the Lehigh & Hudson River Co., and largely interested in other railroad lines, was married in Middletown, N. Y., Dec. 30, to Miss Louise Pierson, of that town.

—Ex-General Manager E. H. Waldron, of the Lake Erie & Western, has been elected President of the Deed's Lamp Adjuster and Trimming Co., and Col. W. H. Shaw has been appointed General Agent.

—It is worthy of note that Dr. Wm. Perry, who died at Exeter, N. H., Jan. 11, age 98 years, was the last survivor of those who were on Fulton's steamboat "Clermont," on its first trip up the Hudson River in 1807.

—Mr. George Michelbach, who was employed by the Erie Co. in building bridges when the road was being built, died in Binghamton, N. Y., last week. For 35 years he has been the Foreman of the freight department at Binghamton.

—Mr. Horace Tucker, General Freight Agent of the Illinois Central, entered the service of that company on Jan. 8, 1862; consequently he has just celebrated the twenty-fifth anniversary of his connection with that road. He has been General Freight Agent for the last twelve years.

—Mr. George L. Perkins, who is this week re-elected Treasurer of the Norwich & Worcester Co., is without doubt the oldest railroad officer in the country. Mr. Perkins has been Treasurer for 50 years, and is now 98 years old, but is still as active as many men who have 30 years less to carry.

—General Freight Agent William Duncan, of the Ohio & Mississippi, has declined the position of General Traffic Manager for the Wabash lines. It is stated that the Erie, the Baltimore & Ohio, and the Ohio & Mississippi people joined in a request to Mr. Duncan, asking him to continue with the Ohio & Mississippi.

—The resignation of Mr. John E. Wootten as General Manager of the Philadelphia & Reading road has been accepted, his general health not having improved sufficiently to enable him to return to work on Jan. 1, as expected. We are informed, however, that there is an excellent prospect of Mr. Wootten's recovery after a long period of rest.

—The many friends of Mr. Samuel M. Cummings, formerly for many years Master Mechanic of the Eastern Division of the Pittsburgh, Fort Wayne, Chicago road, and one of the first members of the Master Mechanics' Association, will hear with regret that he is now in a critical condition at his residence in Dorchester, Mass. His disease—cancer—forbids any hope of recovery, and is likely to prove fatal in a short time.

—The death of Mr. John S. Newberry, of Detroit, Mich., has recently occurred. Mr. Newberry was one of the principal owners of the Michigan Car Works, the Vulcan Furnace, the Detroit Car Wheel Works and the Baugh Steam Forge. He was also Secretary and Treasurer of the Detroit, Bay City & Alpena Co., and a director in the Detroit, Mackinaw & Marquette Railroad Co., the Hamtramck & Detroit Transportation Co. and the Detroit & Cleveland Steam Navigation Co. He has also been in Congress. His estate is estimated at $3,000,000.

—Mr. I. C. Brewer, formerly the Division Engineer of the Lake Shore & Michigan Southern, has gone to Chattanooga, Tenn., where he will enter the service of the East Tennessee, Virginia & Georgia road. He will have charge of the construction of several new branches which this company intends to build. Mr. Brewer has been connected with the Lake Shore for nearly 23 years. He began as Construction Engineer on the Franklin Branch, and built most of the line from Ashtabula to Jamestown. Later, he had charge of the Erie Division, and for 10 years has been Engineer of the Lake Shore Division, extending from Buffalo to Toledo.

—Mr George W. Parsons, for many years a prominent lawyer, died at his residence in New York, Jan. 12, aged 63 years. He was born in Connecticut, but passed all his professional life in New York city. He retired from active practice in 1875. He was an authority on insurance and railroad law, and at one time he was counsel to over 30 insurance companies, a director of the Central Trust Co., and the Buffalo, Rochester & Pittsburgh Railroad, and a member of the Ashley committee on the reorganization of the Lake Erie & Western Co. For many years he was also a member of the Brooklyn Board of Education. As a railroad lawyer and as a referee in his later years, he took one of the highest positions in his profession. Personally he was a man of remarkably unsullied mind and life, generous in his charities, and steadfast in his purposes.

—The wires from Baltimore bring to New York a very electric account of a most "brilliant and magnificent social event." It was a grand ball given on Tuesday evening by Mr. and Mrs. Robert Garrett. There was a gorgeous farrago of people present, to the number of 600, they having congregated from various cities to add lustre to the very handsomest house in Baltimore. All the beautiful effects of white and gold upholstery and fresco, of Gobelin tapestries, bronzes, rare and fine old brasses, only served to blend with the extraordinary and artistic adornment of Baltimore's proverbially handsome women, together with that of the no less lovely feminine contributions from other cities. And the men were very stalwart and of great monetary importance. Altogether it was a very wonderful time.

—The name of John Roach is a familiar one to all Americans who cultivate any sort of familiarity with contemporary persons and events. Though not a public man in the usual sense of the term, he has always been discussed as such, and now that he has died it is not unnatural to use in connection with his decease the stereotyped phrase: "Another great man gone." He was great inasmuch as he rose from actual poverty—if lack of money is poverty—to being the owner of the largest machine works in this country. He was born in Mitchellstown, County Cork, Ireland, Dec. 25, 1813. He was 16 years of age when he landed at Castle Garden. He knew just one man in America, and to him he applied for assistance, though not till after he had proved to himself that it was futile to try and obtain work unaided. He was a born mechanic, and soon overcame the drudgery of his business and developed into a skilled workman. In three years he managed to save several hundred dollars from his earnings, and with a small part of this he started west with the view of finding profitable investment for his capital. The bulk of his earnings were left in the keeping of his employer, Mr. James Allaire. This was most unfortunate for young John Roach, for while he was away Mr. Allaire failed in business and the trust money went with the rest. Then the young man started out again, penniless. He went to work at his trade once more, and soon saved enough to start a small foundry in New York. After some slight prosperity, ill fortune once more overtook him, this time by the wrecking of the foundry from a boiler explosion. John Roach rebuilt his foundry, and from that time, by his unceasing energy and courage, he prospered. He became the owner of the Ætna Iron Works. Then, in 1868, he bought the Morgan Iron Works, and subsequently the Neptune Iron Works, the Franklin Forge and the Allaire Works. It was in 1872 that he bought out the extensive shipbuilding plants of Messrs. Reaney Son & Archbold, at Chester, Pa. Shipbuilding was carried on here much more extensively than has ever been attempted anywhere else in America. Over all the waters of the world the American flag floats from the peaks of great iron steamers built by John Roach & Son. The finest of these steamers are the "City of Pekin" and the "City of Tokio" of the Pacific Mail Steamship Co. Mr. Roach has also built first-class vessels for the Ward, Mallory, Brazilian, Oregon and Quebec lines. The "Pilgrim" of the Fall River Line and several of the Iron Steamboat Company's fleet were built at Chester. The first important contract that Mr. Roach had with the United States Government was the building of the compound engine for the "Trenton." In 1873 he built two sloops of war for $580,000, and constructed the sectional dock at the Pensacola Navy Yard for $219,000. He got a contract to build six iron turreted monitors, and this about covers his work for the government till he contracted for the dispatch boat "Dolphin," and the three steel cruisers, "Atlanta," "Boston" and "Chicago." Mr. Roach was compelled to make an assignment on July 18, 1885. Since then his health has steadily failed. He died Monday, Jan. 10, at his house in New York. He leaves a considerable fortune.

TRAFFIC AND EARNINGS.

Commercial Mileage Tickets.

Commissioner Jno. N. Abbott has issued a circular announcing rulings affecting the agreement of Nov. 1, 1886, in relation to 1,000-mile tickets, to the following effect: That unused coupons of unexpired commercial 1,000-mile tickets may be accepted at a rate of 2 cents per mile in part payment for new mileage tickets, provided the new tickets are purchased by and for use in the service of the purchaser of the original tickets. The application for such transfer or exchange to be made in writing by the original purchaser, and the exchange to be made by the general passenger or ticket agent after the application has received the approval of the general or assistant general freight agent. Transfers thus made are to be reported daily to the Commissioner.

That when commercial mileage ticket contract covers are returned for collection of the $5 rebate, the unused coupons may be redeemed only on the condition that they are accepted as part payment for new commercial 1,000-mile tickets purchased at the time.

That the following practice is in contravention of the agreement of Nov. 1, and therefore should not be continued:

Prior to Nov. 1 it was the custom with some lines in the issue of 1,000-mile tickets to large wholesale houses to make them good by special order-card for any one traveler connected with the house, provided, however, that the traveler's name should be specified on the card. Thousand-mile tickets were made out in the firm name and this special order accompanied the card, notifying the conductors that Mr. John Smith was entitled to use the 1,000-mile ticket 101. After John Smith was through with the ticket he returned it to his firm, who handed the ticket over to Mr. Sam Brown, or some

other traveler, with a similar order on conductors, stating that Mr. Sam Brown was authorized to use the same ticket for that trip.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c
Year to Dec. 31:				
Buff., R. & Pitts.	$1,264,315	$1,265,865	D. $1,550	0.1
California South.	738,791	.....	.....	....
Central Iowa.....	1,325,966	1,307,372	I. 18,594	1.4
Chic. & N. W.....	25,296,393	24,301,058	I. 995,335	4.1
C., St. P., M. & O.	6,152,116	5,814,810	I. 337,306	5.8
Chic. & W. Mich..	1,390,728	1,292,806	I. 98,322	7.6
C., I., St. L. & C.	2,569,364	2,373,467	I. 195,897	8.2
Cleve., Ak. & Col.	525,027	493,786	I. 31,241	6 3
Det., Lan. & No.	1,222,160	1,228,471	D. 6,311	0.5
E. Ten., Va. & G.	4,260,851	4,113,335	I. 147,516	3.6
Gulf, Col. & S. F..	2,288,039	1,849,429	I. 438,610	23.7
Hous. & Tex. C..	3,077,787	2,757,244	I. 320,543	11.6
Illinois Central:				
Ill. lines.....	6,660,900	6,508,112	I. 152,788	2.5
South Div.	4,084,300	4,434,816	D. 350,516	8.0
Iowa lines.....	1,755,200	1,678,336	I. 76,864	4.6
Ind., Bloom. & W.	2,542 811	2,382,920	I. 159,891	6.7
Ind., Dec. & Spr...	451,901	387,991	I. 63,910	16.5
Marq., H. & O..	983,215	824.545	I. 158,670	19.2
Mem. & Charles..	1,444,433	1,339,848	I. 104.585	7.9
Mil & Northern..	646,594	561,260	I. 85,334	15.2
Mobile & Ohio..	2,086,486	2,206,546	D. 120,060	5.5
N. Y. City & No..	544,908	454.545	I. 90,363	19.8
N., Y. Ont. & W..	1,331,468	1,251 396	I. 80,072	6.4
Ohio Southern....	508,758	459,035	I. 49.723	10.8
Rich. & Danville:				
Rich. & D. Div..	4,055,504	3,971,630	I. 83.874	2.1
Va. Mid. Div...	1,550.651	1,556,632	D. 5,981	0.4
West. N. C. Div.	529,041	476,650	I. 52,391	10.9
South Car. Div..	776,451	810 906	D. 34,455	4.2
Col. & Gr. Div..	599,649	696 653	D. 97,004	13.9
St. Jo. & Gd. I..	1,164,779	1,097,828	I. 67,751	6.2
St. L., A. & T. H.:				
Main Line.....	1,262,933	1,269,672	D. 6,739	0.5
Belleville Line..	800,839	766,318	I. 34.521	4.5
St. P. & Duluth..	1.522,326	1 381,212	I. 141,114	10.2
St. P., Min. & M..	7.363,884	7,521,138	D. 157,254	1.7
Staten Island....	799,521	669,624	I. 129,897	19.4
Wisconsin Cent.	1,537,763	1,461,006	I. 76,757	5.3
Min., S. C. & W.	293,473	183,784	I. 109,689	59.6
Wis. & Minn...	352,807	158,074	I. 194,733	123.2
Eleven months to Nov. 30:				
Canadian Pacific.	$9,187,702	$7,637,283	I. $1,550,419	20.3
Net earnings....	3,423,240	2,984,184	I. 439,056	14.7
Ches. & Ohio.....	3,755,866	3,047,038	I. 708,828	23.3
Net earnings....	1,142,723	876,838	I. 265,885	30.3
Ches., O. & S. W..	1,546,450	1,423,568	I. 122,882	8 6
Net earnings...	580,369	456,388	I. 123,981	27.2
Chi., Bur. & Q....	24,359,977	24,226,450	I. 133,527	0 5
Net earnings...	11,854,352	11,366,434	I. 487,918	4.3
C., I., St. L. & C..	2,354,586	2,167,761	I. 186,825	8.6
Net earnings....	917,231	792,738	I. 124,493	15.7
Elis., Lex. & B. S.	856,682	648 734	I. 207,948	32.1
Net earnings..	296,772	248,947	I. 47.825	19 2
L., N. O. & Tex..	1,531,407	1,146,591	I. 384 816	33.6
Net earnings..	416,459	244,367	I. 172.092	70.5
Ohio & Miss....	3,530,914	3,366,711	I. 164,203	4.9
Net earnings...	1,069,643	939.852	I. 129,791	13.8
St. Jo. & Gd. I...	1,060,449	994.706	I. 65,743	6.6
Net earnings....	468,571	316,743	I. 151,828	47.9
Ten months to Oct. 31:				
Central Pacific...	$13.307,006	$12.297,932	I. $9,074	0.1
Net earnings...	7,290.099	7,029,211	I. 260,888	3.7
Sonora.....	238,296	249.712	D. 11,416	4.6
Net earnings..	13,067	45,949	D. 32,882	71.5
Month of October:				
Central Pacific...	$1,508,755	$1,480,588	I. $28,167	1.9
Net earnings..	825,788	922,837	D. 97,049	10.5
C., I., St. L. & C..	247,653	220.266	I. 27,687	12.6
Net earnings..	99,617	94,697	I. 4,920	5.2
Sonora.....	34,056	27.410	I 6,646	25.3
Net earnings...	8,445	6,642	I. 1,803	27.3
Month of November:				
Canadian Pac. ..	$1,073,286	$814.066	I. $259,220	31.8
Net earnings...	625.050	512,062	I. 112,988	22.1
Ches. & Ohio	358,550	284,679	I. 73,871	25.9
Net earnings ..	98,208	79,506	I. 18.702	23.4
Ches., O. & S. W.	178,983	151,545	I. 27,438	18.1
Net earnings....	78,573	53,326	I. 25,237	47.6
Chi., Bur. & Q....	2,256,339	2,318.053	D. 61,714	2.7
Net earnings....	1,149,733	1,249,090	D. 99,357	7.9
C., I., St. L. & C.	208,429	194,678	I. 13,751	7.1
Net earnings...	77.175	72,388	I. 4,787	6.6
Eliz., Lex. & B. S.	89,857	68,293	I. 21,564	31.7
Net earnings..	28,113	31,306	D. 3,193	10.2
Lou., N O. & T.	241,502	212,045	I. 29,457	13.9
Net earnings..	110,154	110.410	D. 256	0.2
Ohio & Miss.....	325,654	304,961	I. 23.693	7.8
Net earnings...	103,800	85,525	I. 18.284	21.4
St. Jo & Gd. I..	95,319	87,309	I. 8.010	9 3
Net earnings....	36,289	40,495	D. 4.206	10.4
Month of December.				
Buff., Roch. & P..	$132,496	$122,553	I. $9,943	8.0
California South.	90.408	.....	.....	....
Central Iowa.....	127,845	127,497	I. 348	0.3
Chic. & N. W.....	2,122,000	1,971,396	I. 150,604	7.7
C., St. P., M. & O.	560,200	466 100	I. 94,100	20.2
Chi. & W. Mich..	103,398	99,650	I. 3.748	3.8
C., I., St. L. & C..	214,777	205,706	I. 9,071	4.4
Cleve., Ak. & Col.	40,855	37,790	I. 3,065	8.1
Det., Lan. & No..	98,187	90,655	I. 7,532	8.3
E. Ten., Va. & G..	404.288	401,452	I. 2 836	0.7
Gulf, Col. & S. F.	234,700	200,732	I. 33.968	16.9
Houston & T. C..	389,143	344,385	I. 24,758	7.2
Illinois Central:				
Ill. lines	615,093	573,600	I. 41,493	7.2
So. Division....	546,457	552,861	D. 6,404	1.2
Iowa lines.....	182,148	160,681	I. 21.467	13.4
Ind., Bloom. & W.	209,973	234 259	D. 24,286	10.4
Ind., Dec. & Spr..	55,374	43.328	I. 12,046	24 0
Manhattan	690,000	630.000	I. 60.000	9.5
Marq., H. & O....	31,936	28,659	I. 3,277	11.3
Mem. & Charles.	177,592	158,933	I. 18.659	11.7
Mil. & Northern..	56,904	46.826	I. 10,078	21.4
Mobile & Ohio ...	306,686	306,124	I. 562	0.2
N. Y. City & No..	43,491	41.168	I. 2.323	5.7
N. Y., Ont. & W.	96,792	96,770	I. 22	....
Ohio Southern....	32,839	53,084	D. 20,245	38.2
Rich. & Danville:				
R. & D. Div....	335,464	348,132	D. 12,668	3.7
Va. Mid. Div...	121,729	124,160	D. 2,431	2.0
Wa. & O. Div...	9,940	7.726	I. 2.214	28.7
West. N. C. Div.	40,420	39,574	I. 846	2.1
South. Car. Div.	64,420	76,349	D. 11,929	15.6
Col. & Gr. Div.	54,188	75.734	D. 21,546	28.4
St. Jo. & Gr'd I..	108,193	93,354	I. 14,839	15.8
St. L., Alton & T. H.:				
Main Line.....	108,317	112,910	D. 4,593	4.1
Belleville Line.	87,230	73,284	I. 13,946	19.0
St. P. & Duluth...	122,265	119,399	I. 3,866	3.2
St. P., M. & Man.	687,030	636,850	I. 180	....
Staten Island....	44,592	41,637	I. 2.955	7.1
Wisconsin Cen...	141,987	117,990	I. 23,997	20.3
M., St. C & W.	30,950	19,491	I. 11,459	58.8
Wis. & Minn ...	54,793	15,065	I. 39,728	263.7

Sonora Railroad earnings as reported above are in Mexican currency.

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Pass Agreement.

The managing officers of various western roads met in Chicago, Jan. 5 and 6, to make an agreement to restrict the issue of passes during 1887. At the meeting of Jan. 5 a committee of General Freight Agents was appointed to prepare a plan for a revised agreement. The plan recommended by this committee was adopted by the General Managers on Jan. 6. The new agreement provides for a Board of Arbitration, consisting of Commissioners Midgley, Fairthorn and Carman, to which all disputed questions relating to the agreement are to be referred for decision.

It being charged that some of the lines had already issued passes for this year to large shippers, evidently for the purpose of influencing business, it was agreed to refer this subject to the arbitrators to decide whether the passes referred to could be withdrawn, or whether the other roads should be authorized to make similar concessions.

Cotton.

Cotton movement for the week ending Jan. 7 is reported as follows, in bales:

	1887.	1886.	Inc. or Dec.	P. c.
Interior markets:				
Receipts.....	70,263	67,670	I. 2,593	3 8
Shipments.....	90,576	84,666	I. 5 910	6.9
Stock, Jan. 7.....	423,252	526,561	D.103,309	19.6
Seaports:				
Receipts..	159,044	140,829	I. 18,215	12,9
Exports.....	195,891	166,208	I. 29,683	18.0
Stock, Jan. 7.....	1,058,027	1,104,466	D. 46,439	4.2

The total shipments from plantations for the crop year to Jan. 7 are estimated at 4,953,776 bales, against 4,926,447 last year, 4,602,128 in 1884-5 and 4,493,364 in 1883-84.

In its monthly review of the cotton trade, the *Commercial and Financial Chronicle* says: "As it will interest the reader to see what has come into sight each month of the season during this and previous years, we have prepared the following, which shows the movement for the last four seasons:

Months.	1886.	1885.	1884.	1883.
September.....	434,838	485,552	413,836	450,047
October.....	1,232,901	1,300,870	1,309,111	1 325,716
November.....	1,579,539	1,443,433	1,390,902	1,317.773
December..	1,467,767	1,488,582	1,350,404	1,264,816
Total 4 months.	4 815,045	4,778,437	4,474,253	4,358,352

"With regard to the weight of bales, the movement up to Jan. 1, shows a decrease in the average weight as compared with the same period of last year, the average this year being 490.01 lbs. per bale, against 490.28 lbs. per bale for the same time in 1885 and 481.92 lbs. in 1884."

St. Louis Live Stock Percentages.

Messrs. Depew, Wicker and Bird, the arbitrators to whom was submitted the question of percentages in the division of east-bound live stock traffic from St. Louis, have made the following award, which covers all shipments from Feb. 1 to Dec. 31, 1886, and will continue in effect until changed by a new arbitration:

Road.	Per cent.
Chicago & Alton	27
Vandalia.....	24
Indianapolis & St. Louis.....	21
Wabash.....	21
Ohio & Mississippi.....	7
Total.....	100

Arbitrator Gault's award, from which an appeal was taken, was as follows:

Road.	Per cent.
Chicago & Alton.....	23
Vandalia.....	24½
Indianapolis & St. Louis.....	21½
Wabash	21½
Ohio & Mississippi...	9½
Total.....	100

The new award thus gives the Chicago & Alton and the Ohio & Mississippi increased shares, the amount being taken from the other lines.

Northwestern Passenger Pools.

The general managers of the roads interested in the Northwestern passenger traffic met at Chicago on Jan. 6 for the purpose of forming a passenger pool between Chicago and St. Paul and Minneapolis. Owing to some of the roads interested not being represented, no action could be taken; but it was agreed to continue in effect the present temporary agreement for the maintenance of rates until Jan 20.

New York City Passenger Travel.

The reports made to the Railroad Commission for the year ending Sept. 30 last give the number of passengers carried on the city lines as follows:

	1885-86. Number.	P. c.	1884-85. Number.	P. c.
Elevated lines. 4.....	115,109,591	35.4	103 702,729	35.2
Surface lines. 1"	210,032,484	64 6	191,319,523	64 8
Total.....	325,142,075	100.0	295,022,256	100.0

The total increase was 30,120,819, or 10.2 per cent. The reduction of fare to 5 cents was in effect on two of the elevated lines for part of the year; the reduction on the two most used linee did not take effect until after the close of the year. It will be seen that the surface (horse) lines still continue to carry the larger part of the passengers. The total movement last year was equivalent to the transportation of 445,400 passengers daily in each direction.

East Carolina Dispatch.

This line has been formed by the New York, Philadelphia & Norfolk and the Norfolk Southern railroad lines in connection with the Wilmington Steamship Co. The line will carry freight over the New York, Philadelphia & Norfolk to Norfolk, Va., and the Norfolk Southern road to Edenton, N. C., and thence by steamboat to the various ports in Eastern North Carolina. At Newberne, freight will be transferred to the Atlantic & North Carolina road for interior points.

Globe Line.

It is stated that the Baltimore & Ohio has given notice of withdrawal from the Globe (fast freight) Line, to take effect on Feb. 1, at which time it has ordered the discontinuance of all agencies. The Line will remain in existence to April 1, when it will expire by limitation.

Coke Pool Meeting.

A largely attended meeting of railroad officials was held in Philadelphia, Jan. 11, for the purpose of arranging the coke pool percentages for the current year. The meeting adjourned, however, without being able to reach a satisfactory settlement.

Southern Passenger Association.

The Southern Passenger Association held its annual meeting at the Hotel Brunswick in New York on Jan. 11. A full representation was in attendance. Commissioner Slaughter was unanimously re-elected. The Illinois Central, the Louisville, New Orleans & Texas and the Mississippi & Tennessee roads were admitted to membership; this makes the aggregate mileage of the roads members of the association 17,000 miles. The Rate Committee, composed of the general passenger agents, met on Jan. 12 for the purpose of revising the passenger tariffs on traffic subject to the association.

Passenger Arrivals at New York from Europe.

During 1886 the number of steerage passengers landed at Castle Garden was 300,918, and the number of cabin passengers landed at the port of New York was 68,742. Considerably more than a third of the cabin passengers were carried by two steamship lines—the Cunard and North German Lloyd. The Cunard line carries almost as many cabin as steerage passengers. Almost half of the latter were carried by four lines of steamers—the North German Lloyd, the Hamburg-American Packet Co., the White Star Line and the Iuman Steamship Co.—though 24 companies were engaged in the business. In carrying the total number 906 trips were made by vessels of the various lines.

Liverpool shipped the greatest number of passengers, 140,194. Bremen comes next with 56,003, then Hamburg with 45,888, then Glasgow with 33,954 and Antwerp with 19,838. The balance sailed from Amsterdam, Rotterdam, London, Marseilles, Stettin, Havre, Bordeaux, Copenhagen and Mediterranean ports.

Central Traffic Association.

The passenger department of the Central Traffic Association held a three days' meeting at Cincinnati last week. The time was solely devoted to arbitration questions, the several roads interested presenting their arguments and statistics to Arbitrator Stevenson. All the cases were taken under advisement, the roads having ten days in which to present additional arguments and the arbitrator to render his decisions within seven days thereafter.

Coal.

Anthracite coal tonnage for the week ending Dec. 31 was 526,937 tons. The total tonnage for the year to Dec. 31, as given by the weekly reports, was, last year, 32,000,477 tons, against 31,470,172 in 1885; an increase of 530,305 tons, or 1.7 per cent. This total may be changed somewhat by the official statement.

The strike of the coal handlers at the shipping points near New York still continues and the trade is completely blocked for the present. This affects chiefly the local trade in New York City and vicinity.

Bituminous coal tonnages for the year ending Dec. 31 are reported as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Cumberland, all lines..	2,551,122	2,795,404	D. 244,282	8.7
Hun. & Broad Top	385,796	176,075	I. 209,721	119.1
Barclay R. R. & C. Co.	177,814	228,571	D. 50,757	22.5
Beech Creek..... 1	050,238	774,057	I. 276,181	35.7
Pennsylvania R. R.:				
Clearfield. 2	254,761	2,873,876	D. 619,115	21.5
Mountain District....	673,440	550,244	I. 123,196	22.4
Penn. and Westmore.1	308,458	1,293,813	I. 14.645	1.1
Minor districts.....	1,427,774	1,096.113	I. 331,661	30.4
Chesapeake & Ohio....1	227.159	1,125.379	I. 101,780	9.1
Norfolk & Western....	864,404	597,284	I. 267,120	44.7
Total.....	11,920,966	11,510,816	I. 410,150	3.6

The total result in the eastern bituminous trade is a small increase. Several of the changes above where losses from 1885 are shown, are due to local causes, as the stoppage from strikes in the Cumberland region, or to diversion and division of trade by the building of new lines, as in the Clearfield region.

Coke tonnages for the year are reported as follows:

	1886.	1885.	Increase.	P. c.
Southwest Penna. R. R.....	2,715,528	1,999,923	715,605	35.8
Minor districts, Pa. R. R....	833,982	644.738	189,244	29.3
Connellsville, *via* Pa. R. R...	62,942	57,652	5,290	9.1
Total coke.	3,612,452	2,702,313	910,139	33.7

The coke trade has had a very good year, with a heavy demand. This still continues, and the only complaint is of inability to fill orders. The tonnages above are all over the Pennsylvania Railroad, no other line reporting coke tonnage regularly.

Cumberland coal shipments for the year ending Dec. 31 are reported by the Cumberland *Civilian* as follows:

	1886. Tons.	Per ct.	1885. Tons.	Per ct.
Balt. & Ohio R. R.....	2,028,681	79.5	2,014,569	72.1
Penna. R. R., Bedford Div....	237,916	9.3	412,676	14.8
Ches. & Ohio Canal.....	284,525	11.2	368,159	13.1
Total.....	2,551,122	100.0	2,795,404	100.0

Local deliveries are included in the Baltimore & Ohio tonnage. The total decrease last year was 244,248 tons, or 8.7 per cent. The falling off in shipments due to the long strike of the miners was partly made up by heavy shipments in the later months of the year. The Baltimore & Ohio proportion of the tonnage was increased last year at the expense of the other lines.

The coal tonnage of the Pennsylvania Railroad Division of the Pennsylvania Railroad for the year just closed was:

	1886.	1885.	Increase.	P.c.
Coal.....	11,693,820	11 579,596	114,224	1.0
Coke.....	3,612.452	2,702,313	919,139	33.7
Total.....	15,306,272	14,281.909	1,024,363	7.2

This includes all coal and coke carried, whether originating on the line or received from other roads. The details of the tonnage last year were as follows:

	Line of road.	From other lines.	Total.	P. c.
Anthracite coal..	1,754,368	2,949,894	4,704,262	39.7
Bituminous coal..	5,668,239	1,321,319	6,989,558	45.7
Total coal.....	7,422,607	4,271,213	11,693,820	76.4
Coke.....	3,549,510	62,942	3,612,452	23.6
Total	10,972,117	4,334,155	15,306,272	100.0

Of the total tonnage 71.7 per cent. originated on the line of the road, and 28.3 per cent. was received from other roads.

The committee having in charge the formation of the new Eastern bituminous pool have, it is reported, agreed upon the following division of the seaboard trade:

	Per cent.		Per cent.
Cumberland...	28.25	Chesapeake & Ohio.....	3 00
Clearfield.....	32.25	Norfolk & Western.....	10.50
Beech Creek.....	10.50		
Elk Garden.....	5.00	Total	100.00
Erie.....	3.00		

This division is, of course, subject to revision, and it is quite possible that considerable changes may be made before the combination is finally formed.

The *Coal Trade Journal* gives the receipts at Chicago for December and the year as follows:

	December. 1886.	1885.	Year. 1886.	1885.
Anthracite	144,748	116,230	1,385,161	1,354,920
Eastern bituminous.....	144,095	108,990	1,055,533	996,986
Illinois.....	145.283	128,349	1,175,001	1,304,575
Indiana.....	93.775	68,820	732,191	643,054
Coke.....	51,263	59,519	540,204	558,963
Total.....	579,164	481.908	4.888,090	4,858,498

The total increase for the year was 29,592 tons, or 0.6 per cent.

San Francisco coal receipts for 1886 were 1,087,690 tons, against 1,023,339 in 1885; an increase of 64,351 tons, or 6.3 per cent. Of the total last year 660,216 tons were Pacific Coast coals.

Lumber Pool.

The general freight agents of the roads interested in the lumber traffic from Chicago and Wisconsin points to the Missouri River points and beyond, met in Chicago on Jan. 3, for the purpose of endeavoring to agree upon a division of that traffic. At a former meeting, the Chicago & Northwestern refused to pool business to competition points west of the Missouri; while the Milwaukee & St. Paul claimed that unless that traffic was

included in the division, rates could not be maintained. There was also a difference of opinion regarding what differential rates should apply on business from the Mississippi River points. The Northwestern and the Wabash roads were not represented at the meeting of Jan. 3, and as nothing could be done without their concurrence the meeting adjourned without taking any action.

RAILROAD LAW.

The Pennsylvania Pool Suits.

In the equity suit of the state of Pennsylvania against the coal combination and trunk-line pool, John H. Jones, Statistician of the anthracite coal combination, was examined at considerable length. When asked what was the maximum yearly capacity of the entire anthracite region the witness gave his estimate as about 45,000,000 tons. The apportionments of the different companies for 1885 were: Philadelphia & Reading, 12,043,499 tons; Lehigh Valley, 6,075,999; Delaware, Lackawanna &, Western, 4,975,000; Delaware & Hudson, 3,410,002; Pennsylvania Railroad, 2,470,999; Pennsylvania Coal Co., 1,550,000; New York, Lake Erie & Western, 565,002. The allotment for 1886 included the three months of the new year ending with March, 1887. Mr. Jones said he was told by Mr. Harris that the Pennsylvania Railroad would not accept a tonnage allotment, which was allowed, the amount being 3,500,000 tons. The allotments of other companies were as follows: Philadelphia & Reading, 12,600,000; Lehigh Valley, 6,354,000; Delaware, Lackawanna & Western, 5,206,500; Delaware & Hudson, 3,568,500; Pennsylvania Coal Co., 1,620,000; New York, Lake Erie & Western, 651,000.

Sleeping Car Company's Liability for Stolen Property.

A Boston dispatch of Jan. 7 says: "The full bench of the Supreme Court rendered a decision to-day of interest to the traveling public as settling the liability of sleeping car companies so far, at least, as the Massachusetts courts are concerned. The case went up on exceptions filed by the defendants, the New York Sleeping Car Co., in the suit of William Lewis and William R. Wing for remuneration for loss sustained while traveling in the cars of this company. In overruling the exceptions Chief Justice Morton said: 'When a person buys the right to the use of a berth in a sleeping car it is entirely clear that the ticket which he receives is not limited to and does not express all the terms of the contract into which he enters. Such a ticket, like the ordinary railroad ticket, is little more than a symbol intended to show to the agents in charge that the passenger has entered into a contract with the company running the cars by which he is entitled to passage in the car named on the ticket. A sleeping car company holds itself out to protect passengers during the night, when a passenger is powerless, from the nature of things, to protect his property. When property such as a man may reasonably carry is stolen the company is liable for it. Such a rule is required by public policy and by the true interests of both the passenger and the company."

Damages from Fire on Railroads.

In his annual message, Gov. Hill, of New York, says: "The frequency of fires caused by locomotive engines, and the injuries sustained thereby to the property along the lines of the railroads of the state, and the inadequacy of existing law to properly protect and indemnify the owners of such property, render the passage of some remedial statute in relation thereto peculiarly appropriate.

"Under the decisions of the courts of our state, railroad companies are not now liable for damages by fire set by their locomotives, unless it can be proved that they are guilty of negligence in the construction or operation thereof. This proof it is oftentimes very difficult or impossible to furnish, and it is believed that the liability should not depend upon that question, but that a sound public policy requires that they should be absolutely liable for all such damages, and that a statute to that effect should be enacted for the protection and indemnity of our farmers and others owning property on the route of railroads.

"It is understood that such a statute as is here proposed has been in operation in Massachusetts since 1840, and the propriety of its enactment in this state is indorsed by the Board of Railroad Commissioners.

"The statute should provide that the railroad companies be regarded as having an insurable interest in the property upon their routes, and be permitted to procure insurance thereon in their own behalf and thus amply protect themselves.

Regulation of Rates—Interstate Commerce.

A Boston dispatch of Jan. 7 says: "An important question, involving interstate commerce and railroads, has just been decided by the full bench of the Supreme Court of Massachusetts. The case is that of the commonwealth against the Housatonic Railroad. Under the statute of 1885, chapter 338, the Railroad Commissioners had fixed a maximum rate for transportation of certain freight between points in Massachusetts and Connecticut. The defendant is alleged to have violated the order by overcharges, but contends that the Railroad Commissioners' order is invalid, alleging that the statute quoted is in violation of Article I. of the National Constitution, giving Congress the exclusive right to govern interstate commerce. Chief Justice Morton's decision sustains the point taken by the defendant. By this decision the Railroad Commissioners have no power to fix interstate freight rates."

New Jersey Railroad Taxation.

In the case of the State of New Jersey against the Morris & Essex Railroad Co., the New Jersey Court of Errors has affirmed the decision of the lower court, holding that the exemption from taxation in the original charter of the company is an irrepealable contract, and that the exemption passed with the lease of the road to the Delaware, Lackawanna & Western Co. The Court holds that the property held by the Morris & Essex Co. at the date of the lease is covered by the exemption, but that the property acquired by the lessee since that date is subject to taxation.

In his message addressed to the Legislature, Governor Abbett treats the question of railroad taxation at considerable length, and recommends a revision of the present law with a view to increasing the revenue to be derived from the taxation of railroad property.

OLD AND NEW ROADS.

Boston & Lowell.—This company on Jan. 5 sold 2,000 shares of new stock at public auction. The stock sold at 136¼, the whole lot being taken by Lee, Higginson & Co., of Boston.

Bristol & Elizabethtown.—This company has been organized to build a railroad from Bristol, Tenn., to Elizabethtown, 20 miles. It is to be a branch of the South Atlantic & Ohio road, now under construction.

Cape Fear & Yadkin Valley.—The city of Wilmington, N. C., has subscribed $150,000 to the capital stock of this company. The terms of the agreement are that the payment of the first installment be made in cash on 30 year 6 per cent. coupon bonds of the said city at par, at the option of the city, and the character of this payment shall determine the others. The city shall pay $10,000 on the subscription for every five miles of road built until its completion. The railroad shall have a depot in the city. The work of construction shall commence within four months after the ratification of the subscription and shall continue without interruption until the road is completed. W. L. De Rosset, Chairman of the Commission, and Julius A. Gray, President of the Railroad company, are the signers of this agreement. From Wilmington to Fayetteville the distance will be about 75 miles.

Central Iowa.—The Central Trust Co. has filed a bill in the Federal Court at Chicago, Ill., to foreclose a consolidated mortgage for $4,409,000 given in 1884 by this company to secure money borrowed for the purpose of building its Illinois division.

Central Pacific.—The statement for October and the ten months to Oct. 31 is given below. The mileage is 1,694, against 1,649 last year:

	October.	Ten months
Gross earnings	$1,508,755	$13,307,006
Operating expenses	682,967	6,816,907
Net earnings	$825,788	$7,290 099
Fixed charges	559,453	5,594,530
Net profits	$266,335	$1,69 ,569
Construction and improvement	65,132	135,014
Balance	$201,203	$1,560,555

Fixed charges include interest, rentals, taxes and the requirements for the government sinking fund.

Chesapeake & Ohio Canal.—President Baughman's report, read at the annual meeting of this company's stockholders, held at Annapolis, Md., last week, was a most gloomy account of last year's facts and this year's prospects. In no season during the whole history of the canal has such an amount of injury been done to the work as during the freshets of 1886. Dam No. 6 was utterly swept away by the fierce torrent. The bed of the canal was dreadfully torn, while the solid masonry and compact banks were often completely destroyed. Yet by sincere and unremitting work the great damage was quickly repaired, and at a small cost. But, unfortunately, it was at a time when the treasury of the company was practically penniless. To meet expenses the remainder of the repair bonds were sold at an average price of 80 cents on the dollar. The prolonged strikes in the coal regions resulted in a shrinkage of coal tonnage; in fact there was a falling off of 100,000 tons. At present all of the company's assets have been used. The debt is constantly increasing, and there is not a dollar to meet the expense necessary in cases of further destruction from flood. Under these circumstances the suggestion is made that the United States Government, inasmuch as it has a large interest in the canal, should offer immediate aid to the company to prevent its ultimate obliteration.

Chicago & Atlantic.—President Benedict has written to Commissioner Blanchard denying that this company has become a member of the Central Traffic Association, but he says that under the influence of certain relations with the Wabash road, the Chicago & Atlantic will join the Association in February. The Commissioner has conferred with Receiver Cooley on this matter, and the latter is reported to have willingly promised to do all he can to further the pooling interests of the several lines and those of the Association.

Chicago, Burlington & Kansas City.—The case of Putnam County, Missouri, against this company was argued last week in the U. S. Supreme Court. This company asserts legislative immunity from taxation, and refuses to pay its taxes upon the whole length of its line through the counties of Putnam, Sullivan, Livingston, Linn, Carroll, and Chariton. The collector of Putnam County obtained judgment against the road, which judgment was affirmed by the Supreme Court of the state. Then the case was carried to the Supreme Court of the United States.

Chicago, Burlington & Quincy.—The statement for November and the eleven months to Nov. 30 is as follows:

	November.		Eleven months.	
	1886.	1885.	1886.	1885.
Earnings	$2,256,339	$2,318,053	$24,359,977	$24,226,450
Expenses	1,106,606	1,068,963	12,505,625	12,860,016
Net earnings	$1,149,733	$1,249,090	$11,854,352	$11,366,434

For the eleven months the gross earnings increased $133,527, or 0.6 per cent., and the expenses decreased $354,391, or 2.7 per cent., the result being a gain of $487,918, or 4.3 per cent., in the net earnings.

Chicago, Fort Scott & Texas.—A charter has been filed in the office of the Kansas Secretary of State, at Topeka, for a line of road to be known by this name. It is intended to run northeast from Fort Scott into Missouri, through the counties of Vernon, Bates, Cass, Henry, Johnson, Lafayette, Saline, Carroll, Chariton, Macon, Shelby, Knox, Lewis, Clark to Alexandria out the Mississippi, and thence northeast to Chicago, and from Fort Scott southeast through the counties of Bourbon, Allen, Neosho, Wilson, Elk, Cowley, Sumner, Harper, Barbour, Comanche, and from thence through the Indian Territory and New Mexico, to El Paso, Tex.

Chicago, Santa Fe & California.—This work is to be pushed on this proposed extension of the Atchison, Topeka & Santa Fe, between Kansas City and Chicago. Contracts have just been awarded for building the road from Sibley, Mo., near Kansas City, where the new line will cross the Missouri River, to Fort Madison, Ia.; also for the construction from Fort Madison to Streator, Ill., and the steel to be used on the latter section is already being delivered. Work will be begun in the spring on the bridge across the Mississippi at Fort Madison, the contracts for which have been awarded.

Cincinnati & Eastern.—Mr. H. B. Morehead, representing the Ohio & Northwestern Railroad Company, has purchased this road for $1,000,000. The road is 103 miles long, and will be extended from Portsmouth, O., its present terminus, to Gallipolis, where it will make connection for Pittsburgh and West Virginia. The conditions of the sale were that $200,000 would be required at once, and further payments should be made as ordered by the Court, and unless such deferred payments were made within twenty days, then the road would be re-sold.

Cincinnati, Hamilton & Dayton.—This company invites sealed proposals, to be sent to F. H. Short, Assistant Treasurer, Cincinnati, or E. W. Woodruff, New York, on or before Feb. 15, for the sale to it of any of the following bonds to an amount not exceeding in the aggregate the sum of $500,000:

Cincinnati, Hamilton & Dayton 5, 6 and 7 per cent. consolidated mortgage sinking fund bonds, due 1905; Dayton & Michigan third mortgage 7 per cent. bonds, due 1911; Dayton & Michigan guaranteed 8 per cent. preferred stock; Dayton & Michigan guaranteed 3½ per cent. common stock; Cincinnati, Richmond & Chicago first mortgage 7 per cent. bonds, due 1895.

Cincinnati, Indianapolis, St. Louis & Chicago.—This company's statement for November is as follows, including also the net profit for the five months of the fiscal year from July 1 to Nov. 30:

	1886.	1885.	Increase.	P. c.
Earnings	$208,429	$194,678	$13,751	7.1
Expenses	131,254	122,290	8,964	7 3
Net earnings	$77,175	$72,388	$4,787	6.6
Fixed charges	50,000	50,000	.....	...
Net Profit	$27,175	$22,388	$4,787	21.4
Profit, 4 months to Oct. 21	182,810	139,696	43,114	30.8
Total profit, 5 months	$209,985	$162,084	$47.901	29.6

The profit for the five months this year was equivalent to 3 per cent. on the stock.

Cincinnati & Muskingum Valley.—A supplemented bill of complaint in the case of Charles Moran vs. this company and Samuel Jeans, et al., was filed last week in the United States Court at Columbus, Ohio. It is to compel the payments of the accrued interest on the bonds to the amount of $1,500,000, the interest being $105,000. The bill of complaint also petitions that the defendants shall be restrained from bringing a suit in appeal in Jefferson County. Litigation involving the same issue is now in the Supreme Court of Ohio, it having been brought up from Jefferson County.

Cincinnati Southern.—A bill providing for the sale of this road has been introduced in the Ohio Legislature. The road is owned by the city of Cincinnati, and is being operated by the Cincinnati, New Orleans & Texas Pacific under a lease.

Consolidated Rolling Stock Co.—This company was incorporated by the Connecticut Legislature of 1886, with authority to take in the Housatonic, Boston & Maine, Bridgeport & New England Rolling Stock Companies' Car Trust Association, which had previously been under the management of John Hurd. Frederick H. Mills was a stockholder and a trustee. He objected to a consolidation which was agreed to by about 90 per cent. of the stockholders, and when bills of sale were executed to the consolidated company, he obtained a temporary injunction, and asked for an accounting and a winding up of each company. Judge Shipman has now denied the motion and dissolved the injunction.

Denton & Western.—The projectors of this road have decided to amend the charter lately obtained and to increase the capital stock to $150,000. Judge J. A. Carroll, of Denton, Tex.; L. A. Crane, of Decatur, and Thomas F. West, of Jacksboro, have been appointed as a committee to carry out the company's plans.

Denver, Memphis & Atlantic.—The Fitzgerald & Mallory Construction Co. has, during the month of December, laid the track on this road from a point 2½ miles west of Peru, Kan., to the west line of Chautauqua County, distance 28.4 miles. The stations known as Rogers, Wauneta and Cedarvale are open for business. Track was also laid from a point 2½ miles west of Penalosa, Kan., to a point ½ mile northwest of Turon, Reno County, distance 6.4 miles. A station was established at Turon.

Denver & Rio Grande.—This road has been substantially improved and new branches have been started. One extends from Red Cliff, Col., down the Eagle and Grand rivers to Glenwood Springs, and another is now being located from Montrose to within four miles of Ouray.

Denver & Scranton.—This road was recently completed and opened for business from Denver, Col., to Scranton, 17 miles. The road is intended to serve the coal mines at Scranton.

Duluth, South Shore & Atlantic.—The surveying engineers for this new line are at work from Sturgeon, Mich., westward, and from Sage Junction, Mich., to the Sault. The line west of Sturgeon is divided into three divisions, known as the Summit, Gogebic and Western, each with its engineer in charge. On the first and second of three divisions there are three parties at work, and on the last, two parties. On the Sault branch the locating survey is nearly ended, and the contractors, Messrs. Rexford Bros. & Hodge, have already begun operations. This gives a very large organization for the work of the survey, there being a chief engineer and assistant engineer, four division engineers and eleven assistant and resident engineers. The parties at work west of Marquette average 22 men each, or about 180 men in all, while the parties on the Sault Division bring the number of men employed on the survey up to 225.

Fitchburg.—The terms of the sale of the Troy & Greenfield road and Hoosac Tunnel to this company are as follows:

On and after Feb. 1 the Fitchburg Railroad Co. and the Troy & Greenfield road and Hoosac Tunnel with everything appertaining (except the Southern Vermont Railroad) shall become consolidated and shall be called the Fitchburg Railroad Co. Said corporation shall then have and enjoy all the franchises, powers and privileges, property and rights belonging to the Fitchburg Co. now existing, and to the Troy & Greenfield road and Hoosac Tunnel, and to the commonwealth of Massachusetts in its capacity as owner of the same, and shall assume all the debts, liabilities and duties of the different companies. The capital stock of the corporation shall, until the amount is changed according to law, consist of $12,048,800, divided into shares of $100 each, to be issued as follows: Preferred stock, $7,048,800; common stock, $5,000,000. Every share of the capital stock of the present Fitchburg Co. shall at once become a share of the preferred capital stock of the consolidated company, and within four months after Feb. 1 there shall be issued to the commonwealth of Massachusetts 50,000 shares of common stock in the consolidated company, and to the Fitchburg Railroad Co. 17,622 shares of preferred stock, the same to be divided *pro rata* among the shareholders of the Fitchburg Co. on Jan. 31 current. The preferred stock shall be entitled to such semi-annual dividends as can be paid out of the profits of the corporation, not to exceed 4 per cent. per annum, free from tax. After this payment upon preferred stock to the amount of 4 per cent. per annum in any one year, any balance of annual earnings which may be divided shall be applied to the payment of dividends upon the preferred and common stock, each sharing equally. The common stock shall have no voting power until it shall have received dividends for 2 consecutive years, amounting to not less than 4 per cent. per annum, except that it shall have the right to vote on an equality with the preferred stock upon any question of leasing any part of the consolidated road or of hiring or uniting with any other road.

As soon as practicable, the corporation shall issue and the commonwealth shall receive bonds of the said consolidated company to the amount of $5,000,000, reckoned at par, dated Feb. 1, 1887, payable at the expiration of 50 years from date with interest payable semi-annually, for the first 5 years at 3 per cent. per annum, 3½ per cent. for second 5 years, and 4 per cent. for the remaining 40 years. On or before May 1, 1887, the company shall execute a mortgage of its entire road, property and franchises. To the trustees of this mortgage there shall be issued from time to time bonds of an amount equal to the bonds and mortgage notes outstanding, which are a lien upon any such

property, said bonds to be reserved in the keeping of the trustees until the discharge of such lien, or turned over to the holders in discharge thereof. There shall also be issued to the trustees bonds to an amount equal to that of the outstanding unsecured debts of the present Fitchburg Co., and of any road that shall hereafter become consolidated with the corporation hereby created. The by-laws of the present Fitchburg Co. shall constitute the by-laws of the consolidated corporation until legally changed, and the present officers of the Fitchburg Co. shall be the officers of the consolidated company until new ones are chosen. This agreement is made subject to the rights of other connecting railroads under existing leases, and no existing lease or contract made by or in behalf of the commonwealth, concerning the use of said Troy & Greenfield road and Hoosac tunnel, or any part of the same, shall be affected by this agreement, but the rentals and income therefrom shall, from and after February 1, enure to the benefit of said consolidated corporation. The directors of the Fitchburg Co. shall have the right before Feb. 1 to declare a dividend not exceeding 2 per cent., which dividend shall be paid by the consolidated company to the holders of stock in the Fitchburg Co. of record on Jan. 31, 1887, and the commonwealth shall have the right to retain all the earnings of the Troy & Greenfield road and Hoosac tunnel up to Feb. 1. All debts of the commonwealth in its capacity as owner of the Troy & Greenfield road and Hoosac tunnel, incurred before Feb. 1. 1887, arising out of contracts (except such as may arise out of a certain contract for ties with John L. Roper) shall be paid by the commonwealth, not including therein any claim for personal injuries or injury to merchandise. All such claims shall be assumed by the consolidated company, including all claims for personal injury by accident near Bardwell's Ferry. Said corporation shall assume the obligation of the Roper contract. On and after Feb. 1, said consolidated corporation shall have exclusive management and control of the Troy & Greenfield road and Hoosac tunnel.

To the contract are affixed the following signatures: George D. Robinson, [Governor; Oliver Ames, Lieutenant-Governor; Jonathan Bourne, John Haskell Butler, Henry C. Greeley, Abraham Coffin, Warren Locke, Frank D. Allen, Lawrence J. Logan, Lewis Powers, Executive Council.

The Fitchburg Railroad Co., by E. B. Phillips, President and Director; Robert Codman, Rodney Wallace, C. T. Crocker, Directors.

Fort Worth & Rio Grande.—There are 3,500 tons of steel at Galveston, Tex., which will be used to lay the track between Fort Worth and Granbury.

Gainesville, Henrietta & Western.—A new town called Childress has been established on this line, 11 miles west of Gainesville, Tex., and business lots are advertised for sale. The track was laid from Gainesville to Childress on Dec. 31, and since that time has been extended for 5 miles westward. The new road will connect with the Fort Worth & Denver City at Henrietta.

Georgia Pacific.—The engineers are about to run a line from Columbus, Miss., to Greenwood for the extension of this road to the Mississippi River. The line will take in Starkville and Winona and connects at Greenwood with the western division of the road running to Greenville, which will be widened to standard gauge. The road from Columbus to Greenville will be about 150 miles long.

A report is now in circulation that the road is to be sold to the Kansas City, Memphis & Birmingham Co. The report needs confirmation, though not improbable.

Grand Trunk.—There is a report to the effect that this company has secured charters for its proposed extension to Duluth. The projected line would make the distance from Duluth to Montreal 250 or 300 miles shorter than by way of Chicago and New York.

The St Clair River tunnel is intended to connect this line with the Chicago & Grand Trunk at Port Huron Mich., although it is to be built by a company independent of the corporations owning and controlling these roads. The present connection of the lines is a ferry which transfers the trains between Point Edward, Canada, and Fort Gratiot, Mich. This ferry is about three miles north of the proposed tunnel. The length of the tunnel will be one mile, of which 2,310 ft. will be under the river. The depth of the lowest part of the tunnel below the surface of the water will be 80½ ft., and the minimum depth of the top of it below the bed of the river will be 15 ft.

Gulf, Colorado & Santa Fe.—This company has bought the right of way through the stock farm of James Arbuckle near Dallas, Texas, for the continuation of the Water street line up the Trinity River. The fact is important inasmuch as it seems to be a preliminary move on the part of this road to tap the Gainesville & Fort Worth line, and bring it into Dallas. It is thought that the Dallas & Wichita will be bought by this company.

Illinois Central.—Work on the Kentucky approach of the new bridge across the Ohio at Cairo, Ill., will begin this week. The bridge itself will be 1¼ miles long, and the approaches 1⅛ miles each. It will be 53 ft. high under the main arch. Steel is to be the material used.

This company makes the following statement of gross earnings for the year ending Dec. 31, the December earnings of last year being partly estimated:

	1886.	1885.	Average, 7 yrs. 1878-84.
Illinois lines	$6,660,900	$6,508,112	$6,334,283
Southern lines	4,084,300	4,434,816	3,780,091
Total lines owned	$10,745,200	$10,942,928	$10,114,374
Dubuque & Sioux City	948,300	911,630	1 024 812
Iowa Falls & Sioux City	635,300	626,529	616 077
Cedar Falls & Minnesota	171,600	140,177	126,640
Total lines in Iowa	$1,755,200	$1,678,336	$1,767 529
Total from traffic, all lines	$12,500,400	$12,621,264	$11,881,903

The earnings for 1886 show the following changes and comparisons:

	As compared with 1885.		As compared with Av. 1878-84.	
Illinois lines	Inc. $152,788	2.5	Inc. $326,617	5.1
Southern Division	Dec. 350 516	8.0	Inc 304,209	8 0
Iowa lines	Inc. 76,864	4.6	Dec. 12,329	0.7
Total	Dec. $120,864	1.0	Inc. $618,497	5.2

The decrease last year was wholly on the Southern Division, which fell 8 per cent. behind the exceptionally large earnings of 1885. This division is the only one which has had any considerable increase in mileage for several years past.

Indiana, Bloomington & Western.—The announcement is made that the Cleveland, Sandusky & Cincinnati and the Springfield & Columbus have entered into an agreement for a consolidation with this company, the new system to be known as the Columbus, Sandusky, Indianapolis & Western. It will include 548 miles of road from Peoria, Ill., to Sandusky, and from Columbus to Peoria. The agreement is to be submitted to the stockholders.

Jacksonville, Tampa & Key West.—The Tavares Division has been opened for business from Sanford, due west to Tavares, Fla., a distance of 29 miles.

Kingston & Pembroke.—It is announced that the banking firm of R. P. Flower & Co., of New York, has negotiated a sale of 10,000 shares of the stock of this company to a London syndicate. The road is 112 miles long, and extends from Kingston, Ont., to Renfrew, Ont., where it connects with the Canadian Pacific. By the way of the New York Central and the Rome, Watertown & Ogdensburg, it forms a line between New York and Winnipeg, about two hundred miles shorter than the lines by way of Chicago.

Along the route are said to be unusually fine beds of iron ore. A syndicate of Chicago steel manufacturers and Canadian capitalists developed this property last year and shipped about 4,000 tons of the ore. This year they have contracted for the delivery of 30,000 tons. The company has received $1,000,000 as a bonus from the Canadian Government, and a grant of 65 acres of land from the city of Kingston for terminal facilities, with a valuable water front within the city limits.

Lake Erie, Essex & Detroit River.—This proposed road will run from or near Windsor, Ont., to Leamington, Essex County, via Harrow, Kingsville and Ruthven, Ont. In connection with the municipal election last week at South Colchester township, a vote was taken for granting a bonus of $20,000 to this projected road. The by-law was carried by a large majority.

Lake Erie & Western.—The purchaser, General Samuel Thomas, has agreed to sell the property to a new company to be formed, called the Lake Erie & Western Railroad Co., whose line will extend from Sandusky, Ohio, to Peoria, Ill., 430 miles, and which will issue the following securities: $4,300,000 first-mortgage gold 5 per cent. 50-year bonds, being at the rate of $10,000 per mile; $8,600,000 preferred stock, being at the rate of $20,000 per mile; $8,600,000 common stock, being at the rate of $20,000 per mile. All old securities have been extinguished by the sale, and will receive their respective portions of the purchase money from the officers of the court. The present car trusts will also be paid off, leaving the property free from lien except as above.

Louisiana, Arkansas & Missouri.—This company has been organized at Little Rock, Ark., and will construct a road from Brinkley, Ark., on the Memphis & Little Rock Railway, to the Louisiana line. Its length will be 260 miles.

Mexican International.—It is reported that this road is graded for 75 miles south of Castrano, Mexico, and that tracklaying is proceeding at the rate of a mile a day. It is expected to be completed to the junction with the Mexican Central at Lerdo by Feb. 1. This will shorten the rail route to the City of Mexico about 400 miles.

Minneapolis, Sault Ste. Marie & Atlantic.—It has been decided to build this road by the southern route from Rhinelander, Wis., so that it will cross the Milwaukee, Lake Shore & Western at Gagen, pass around the South End of Pine Lake, through town 37, range 17 east, in Wisconsin; cross the Northwestern road at Hermansville, and go direct to Sander's Point. The road will reach the latter point next fall. Contracts are now being let. It is intended to build a branch to Florence, Wis., in order to secure the iron business along that route.

Mississippi Valley.—It is reported that arrangements for building this road are completed. It will run from Bowie, Ark., through Madison, Tensas, Concordia, Point Coupee and West Baton Rouge, where it will connect with the Texas Pacific, the Louisiana Central and the Louisville, New Orleans & Texas. The object of the road is to open up the cotton regions of Louisiana.

Missouri Pacific.—John M. Woodward has filed suit against this company for $1,000,000. He alleges that the company has broken a contract made with him, wherein he agreed to prove that the St. Louis & San Francisco Railroad Co. had forfeited all charter rights to construct and operate a road between Pacific, Mo., and St. Louis.

New Jersey Junction.—This road is now building, and is expected to be open for business in the course of three months. It begins at Weehawken Ferry at the east end of the West Shore tunnel, passes straight along the shore, around King's Bluff, and through the stock yard, coal and oil docks of the Erie road. Thence it runs at the foot of the hill on the western edge of Hoboken, and passes under the Delaware, Lackawanna & Western a little east of the east end of tunnel under Bergen Hill. It then rises along the bluff, crosses the Erie road on an iron viaduct 300 ft. in length. This is about 200 ft. east of the east end of the Erie Co. tunnel under Bergen Hill. The road then descends, and passes under Newark avenue, Jersey City, and immediately east of the old Jersey City and Harsimus Cemetery; then under the Harsimus freight line of the Pennsylvania road to a connection with the new main passenger line of the Pennsylvania road, now in course of construction. A branch road connects with the freight line near Sixth and Division streets, Jersey City. The road will be of the same character of track as the West Shore; 67 pounds steel rail, and stone ballast. To the connection with the Pennsylvania Passenger line the road is 4⅛ miles long. The Harsimus branch connection is ½ mile long. From Weehawken to connection with the Erie it is constructed with three tracks, two of which are used as the main track, and the third one for the Erie road's connection with its oil, stock and coal business of their Weehawken terminal. The road is now completed to the viaduct over the Erie. The work of construction is being done by the New York Central & Hudson River Co. The masonry contractor is Miles Tierney of Jersey City. The iron superstructure of the Erie viaduct is built by the Phœnix Iron Works, Philadelphia. All other iron bridges by Wallace Iron Works of Jersey City. Timber and pile bridging by Ross & Sanford, Jersey City.

A romantic fact connected with this road's construction is that it passes directly over the spot where the famous Burr-Hamilton duel was fought.

Bonds of this company to the amount of $1,300,000 are now offered for sale in New York at 108½; it is stated that $700,000 have already been taken by investors. These bonds bear 4 per cent. interest and are guaranteed by the New York Central & Hudson River Co.; the total issue is to be $4,000,000.

Newport News & Mississippi Valley Co.—The statement of this company for November is as follows:

	Gross earnings 1886.	Gross earnings 1885.	Net earnings 1886.	Net earnings 1885.
Ches. & Ohio	$358,550	$284 679	$98 208	$79.506
E., L. & B. S.	89,857	68,293	28.113	31,306
C., O. & S. W.	178,983	151.545	78,563	52,326
Total	$627,390	$504,517	$204,884	$164,138

The total gross earnings show an increase of $122,873, or 24.3 per cent., while the net earnings increased $40,746, or 24.8 per cent.

New York, Chicago & St. Louis.—Mr. Chauncey M. Depew expresses the opinion that all parties concerned in the litigation over this property should now come together and try to arrive at an amicable settlement.

New York, Lake Erie & Western.—Judge Van Brunt has decided in the New York Supreme Court the case of the holders of $350,000 of car trusts of the New York series, "F" and "G," of this road, who refused to accept the proposition of the company to reduce the interest from 6 to 5 per cent., and to reduce the amount of annual drawings so as to extend the ultimate payment claimed by the minority beyond the life of the equipment. The decision is that the papers do not bind the certificate holders, and that the question of the power of the majority does not therefore come before the Court.

New York & New England.—A motion to re-open the case of George Ellis against the Boston, Hartford & Erie, which involves the validity of the foreclosure through which that road came under the control of the New York & New England, was made on Tuesday last, in the Supreme Court of Massachusetts. The case was adjourned until Feb. 22.

Northern Central.—The Chemung, the Elmira, Jefferson & Canandaigua and the Sodus Bay & Southern have been consolidated, and the company thus formed will be known as the Elmira & Lake Ontario. Capital, $1,500,000. The line owned by the new company extends from the Pennsylvania state line near Elmira, N. Y., to Sodus Bay on Lake Ontario. All the companies forming the consolidation have been for years controlled by the Northern Central Co., and their roads have been leased and worked by that company.

Northern Pacific.—At a meeting in New York last week, the directors of this company voted against the proposed lease of the Oregon Railway & Navigation Co.'s property jointly with the Union Pacific. It was unanimously voted to continue negotiations with the Union Pacific for harmonious traffic relations in Oregon and Washington territories.

The gross and net earnings by months, in 1885 and 1886, have been as follows:

	Gross Earnings. 1886.	Gross Earnings. 1885.	Net Earnings. 1886.	Net Earnings. 1885.
July	$1,100,026	$1,000,011	$534,526	$510,444
August	1,226,358	971,289	658,952	508,708
September	1,372 674	1,224,955	769,091	692,059
October	1,441,667	1,522,285	874,680	808,814
November	1,299,906	1,249,358	749,247	717,605
Total 5 months	$6,442,630	$5,967,898	$3,586,416	$3,334,430

Land sales for the same period in 1886, 117,261 acres; amount of sales, including town lots, $409,560.

Ohio River.—This company will hold a meeting at Parkersburg, West Virginia, on Feb. 5, to increase their capital stock from $5,000,000 to $6,000,000, and to consider extending their road to Huntington.

Ohio Southern.—The car and machine shops belonging to this company at Springfield, Ohio, were burned last week. Six locomotives, two cars, valuable machinery and the buildings were destroyed. Loss, $140,000; fully insured.

Omaha Southern.—A meeting of stockholders of the Omaha Southern and the Omaha & Southwestern was held in Omaha, Neb., last week, for the purpose of electing directors of the road, which is to be built on a line to be formed from the proposed route of both of the above companies. The intention is to have the road extend through Southern Nebraska *via* Valparaiso, thence through Kansas, Indian territory, and Texas to the Gulf of Mexico. The shops of the company are to be located in Omaha.

Pennsylvania.—The statement is made that this company has purchased the plot of land at the foot of 37th and 38th streets, Twelfth avenue and North River, in New York, on which to erect a ferry-house. The price paid is put at $300,000. This will be of great advantage to the road, because it will require only a short branch track to connect with the New York Central & Hudson River road's freight trains to Spuyten Duyvil, besides landing passengers in the resident part of the city.

Pennsylvania Company.—The Ashtabula Railroad Co., which is a part of this system, has formally taken possession of the Lawrence Railroad (the Youngstown Branch of the Fort Wayne) the purchase of which was negotiated some time ago.

Pittsburgh & Lake Erie.—It is understood that an attempt will be made to break the trust under which most of the stock of this company has heretofore been held. The Pittsburgh stockholders charge that the Vanderbilt interest is preparing to turn the road over to the Pennsylvania, and this they wish to prevent.

Rome, Watertown & Ogdensburg.—During 1886 there were 46 miles of track relaid with 60-lb. steel rails; several iron bridges have been constructed; 28 stations on the line were repaired and repainted; more than 100 steel frogs and safety switches were put in; almost 300,000 cross ties were laid and 65 miles of wire fencing were built. Two locomotives, six passenger coaches and 200 freight cars were added to the equipment. Important connections have been made at Syracuse, Fulton, Rochester and Ogdensburg.

St. Joseph Terminal Co.—This company has purchased a large tract of ground in South St. Joseph, Mo., on which to build shops, depot and round-houses. The depot and round-houses will be used by the St. Paul, St. Joseph & Grand Island and the St. Joseph & St. Louis roads. The shops will give employment to 800 men.

St. Louis, Arkansas & Texas.—The right-of-way agents of this line are having trouble with the farmers near Whitewright, Tex., in regard to purchasing their lands. Mr. F. C. Dillard, of Sherman, Tex., is endeavoring to arrange matters by arbitration.

St. Louis Bridge.—It is stated that negotiations are in progress looking to a joint operation of the St. Louis Bridge and Tunnel property and the abolition of the bridge arbitrary, thus, in effect, making the bridge free. Concerned in the scheme are the Gould lines, the St. Louis & San Francisco and the east-bound trunk lines. It is intended that these companies shall assume the lease of the property of the Bridge & Tunnel Co., operate it, and abolish the arbitrary rate now charged.

Salem, Ste. Genevieve & Centralia.—The surveying party of this road began work last week at a point immediately southwest of the shaft of the Salem Coal & Mining Co., near the track of the Ohio & Mississippi, in the western part of Marion County, Ill. The line will run directly to Centralia, crossing the Central & Jacksonville and the Southeastern roads at that point. The road from Salem to Ste. Genevieve will be about 75 miles in length.

Salina, Columbus & South Eastern.—This road is intended to run from Salina, Kan., to Galena, 300 miles; branch, Parsons, Kan., to Topeka, 110 miles. Grading has begun between Parsons and Columbus, and tracklaying will be commenced as soon as the weather permits.

Texas & Pacific.—The coal which was recently discovered near Strawn, Tex., on this line, has been used in a trial at Big Springs. Ten tons were burned in a locomotive at the shops and in an office stove, with results that were fully satisfactory. There was absolutely no clinker, and its steam producing qualities were equal to Indian Territory coal.

This is considered a very important find for the Texas & Pacific company.

Toledo & Ohio Central.—This company has closed a contract for 1,000 tons of new steel rails to be delivered in February.

Topeka & Southern.—The charter of this road has been filed at Topeka, Kan., providing for a line of road from Topeka, running through Shawnee, Osage, Coffey, Woodson, Wilson, Montgomery, Labette, Neosho and Cherokee counties, a distance of 250 miles. Capital stock, $5,000,000.

Union Pacific.—This company has revoked the order introducing the 24 hour system of keeping time. It was done by order of President Adams, who is said to have distrusted the new system.

Vincennes & New Albany.—This is the name of a company which proposes to build a road to connect Jasper in Dubois County, Ind., with New Albany. The line passes through Dubois, Orange, Washington, Harrison and Floyd counties, and will be 73 miles in length. The company's capital stock is $1,800,000, and is held chiefly by New York parties, including W. P. Hobart, Emil Wollman and E. F. Fuller, who own 2,400 shares each.

West Ontario Pacific.—This is an extension of the Ontario & Quebec system, branching from the Credit Valley at Woodstock, Ont., and extending to London, a distance of 26½ miles, and from London to the Detroit River, distance 110 miles. Between Woodstock and London the road is well nigh completed, while the location surveys are made on the other section. With a single exception, no grade on the entire road will ascend more than 15 ft. per mile. The bridging consists of one span of 100 ft. over the Thames at Woodstock, 600 feet of trestle of a branch of the river at Thamesford, 600 feet at a ravine immediately east of the latter point, and three small pile trestles over minor streams. The road from Woodstock to London is expected to be open for business in May next. The contractors are Messrs. Henry McFarlane & Son.

Wilkes-Barre & Western.—This road has been opened for business from Watsontown, eastward, to Lethergo, Pa., a distance of 11 miles.

Zanesville & Ohio River.—There is a report of a fight between the Zanesville & Ohio River, the Baltimore & Ohio and the Cincinnati & Muskingum Valley roads over the right of way along the canal bank near Zanesville, O. The matter is now before the City Council. Track was laid by the Zanesville & Ohio River people one day last week. An injunction was gotten out to stop the work, but before it could be served the tracklaying was completed.

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New York Central & Hudson River.

We have heretofore given (number for Dec. 24, page 898) the preliminary statement made public by this company. The full report to the New York Commission for the year ending Sept. 30 last is now completed giving some additional information, which is presented below.

The total road operated is now 1,541, an increase of 548 miles, due to the lease of the West Shore road. The total mileage of *track* at the close of the year was 3,688.25, against 2,720.45, an increase of 967.80 miles.

The earnings, etc., include the operations of the West Shore road from Jan. 1, 1886, for three-quarters of last year.

The equipment at the close of the year included 853 locomotives; 508 passenger, 4 dining, 148 immigrant, 77 combination and 203 baggage, mail and express cars; 32,280 freight cars. There was an increase during the year (chiefly through the West Shore lease) of 196 locomotives; 176 passenger, 1 dining, 51 immigrant, 14 combination and 69 baggage and mail cars; 7,536 freight cars.

The company owns 5 grain elevators, with a total capacity of 3,450,000 bushels, having made no change in this respect during the year.

The average number of persons employed last year was 19,260; the salaries paid amounted to $10,502,460, an average of $545 each.

The traffic movement for the year was as follows:

	1885-86.	1884-85.	Inc. or Dec.	P c
Pass. train miles..	7,918,261	6,215,121 I.	1,713,080	27.5
Freight " " ..	12,502,729	11,364,362 I.	1,138,367	10.0
Pass. carried:				
Through.....	168,188	142,034 I.	26,154	18.3
Way.....	14,493,930	12,605,767 I.	1,888,163	14.1
Total.....	14,662,118	12,747,801 I.	1,914,317	15.0
Passenger-n.-s..	476,128,729	438,397,774 I.	37,730,955	8.6
Tons freight carried:				
Through eas-b'd.	1,435,515	1,416,687 I.	18,828	1.3
" west-b'd.	389,490	299,210 I.	90,180	30.0
Way east bound...	7,149,914	5,914,786 I.	1,235,148	20.8
" west-bound..	3,743,262	2,172,274 I.	570,988	17.9
Total.....	12,718,101	10,802,957 I.	1,915,145	17.7
Total ton-miles....	2,414,466,463	2,137,824,205 I.	276,442,258	12.9
Average train l'd:				
Passengers No ...	60	70 D.	10	14.2
Freight, tons.....	193	188 I.	5	2.6

The average passenger journey last year was 32 miles and the average freight haul 189 miles, against 34 and 198 miles in the preceding year.

The earnings per train mile have been:

	1885-86.			1884-85.		
	Earnings.	Expenses.	Net.	Earnings.	Expenses.	Net.
Passenger..	$1.10	$0.73	$0.37	$1.09	$0.70	$0.24
Freight	1.47	1.02	0.45	1.29	1.01	0.28

The earnings per unit of traffic were as follows, in cents:

	1885-86.			1884-85.		
	Earnings.	Expenses.	Net.	Earnings.	Expenses.	Net.
Per passen-ger-mile.	1.84	1.22	0.62	1.41	1.08	0.33
P'r ton-mile	0.76	0.53	0.23	0.68	0.54	0.14

The increase in the average freight rate of 0.08 cent., with a very small change in the cost of movement, explains much of the improvement in the result of the year.

The statement of receipts and disbursements is as follows:

Earnings:	1885-86.	1884-85.	Inc. or Dec.	P c
Passengers..	$8,786,124	$6,219,639 I.	$2,566,485	41.2
Freight.....	18,476,532	14,702,538 I.	3,773,994	25.8
Mails	778,080	710,664 I.	68,416	9 6
Rents.....	1,217,564	1,201,595 I.	15,969	1.3
Telegraph	7,167	7,335 D.	168	2.2
Interest.....	471,949	811,154 D.	339,205	41.8
Use of road ..	327,828	319,015 I.	8,813	2.7
Other sources	440,217	457,501 D.	17,284	3.7
Total.....	$30,506,261	$24,429,441 I.	$6,076,920	24.8
Charges:				
Working ex..	$18,610,376	$16,319,372 I.	$2,291,004	14.0
Interest.....	3,559,651	3,681,795 D.	122,144	3.3
Rent of leased lines.....	3,482,280	1,976,028 I.	1,506,252	76.2
Dividends paid	3,577,132	3,129,991 I.	447,141	14.2
State tax.....	203,955	275,903 D.	71,948	26.0
Total.....	$29,433,394	$25,383,089 I.	$4,050,305	15.9
Balance .....Sur.	$1,072,967	Def. $953,648 I.	$2,026,615	212.5

The working expenses last year were 61.0 per cent. of gross earnings, against 66.8 per cent. in 1885-86. The net profit per share last year was $5.20, against $2.43 in the previous year, while the dividends paid were 4 per cent., against 3½.

The general balance sheet and the earnings and income statements heretofore given are not repeated here.

Buffalo, New York & Philadelphia.

This company operates in all 663 miles of road, 440 miles owned and 223 leased. The report is for the year ending Sept. 30.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.c.
Earnings.....	$2,624,019	$2,393,437 I.	$230,632	9.6
Expenses.....	2,048,842	1,764,447 I.	284,395	16.1
Net earnings.....	$575,227	$628,990 D.	$53,763	8.5
Gross earn. per mile...	3,958	3,610 I.	348	9.6
Net " " " ...	868	949 D.	81	8.5
Per cent. of exps	78.1	73.7 I.	4 4	...

The increase in expenses was largely due to removals made by the Receiver, who is now operating the road, pending a foreclosure and a reorganization of the company.

Rentals, taxes and insurance amounted to $146,369 last year; interest on real estate mortgages, car trusts and floating debt to $206,233; a total of $352,602, leaving a balance of $222,625. The interest accrued (but not paid) on the funded debt was $1,410,380, being $1,187,755 in excess of the surplus, and showing a deficit of that amount for the year.

Louisville, New Albany & Chicago.

This company operates lines from Louisville, Ky., to Michigan City, Ind., 294 miles; from Indianapolis, Ind., to Chicago, 183 miles, and from Bloomfield, Ind., to Switz City, 43 miles; a total of 520 miles. Of this it owns 494 miles, leasing 4 miles of road into Louisville, 2½ miles into Indianapolis and 19½ miles (the Chicago & Western Indiana) into Chicago. The line from Bloomfield to Switz City, formerly the Bedford & Bloomfield, was bought April 1, 1886. The statement is for the year ending Dec. 31.

The earnings and expenses for the year were as follows:

	1886.	1885.	Inc. or Dec.	P c.
Earnings.....	$1,905,535	$1,680,454 I.	$225,081	13.4
Expenses.....	1,256,057	1,332,036 D.	75,979	5.7
Net earnings...	$649,478	$348,418 I.	$301,460	86.5
Gross earn. per mile.	3,744	3,523 I.	221	6 3
Net earn. per mile...	1,276	730 I.	546	74.8
Per cent. of exps....	65.9	79.2 D.	13.3	...

The interest and rental charges last year amounted to $529,000, leaving a surplus of $120,478 for the year. The company has several extensions in progress with a view of completing its connections and increasing local business.

Richmond & Alleghany.

This company owns a line from Richmond, Va., to Clifton Forge, 230.25 miles, with 22 miles of branches owned and 4.63 leased; a total of 256.88 miles. The statement is for the year ending Sept. 30.

The road is operated by Receivers, pending a foreclosure and a reorganization of the company.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Earnings.....	$597,048	$589,591 I.	$7,457	1.3
Expenses.....	438,350	404,918 I.	33,432	8.3
Net earnings.....	$158,698	$181,673 D.	$25,975	14.0
Gross earn. per mile....	2,324	2,317 I.	7	0.3
Net " "	618	721 D.	103	14.3
Per cent. of exps.....	73.4	68.7 I.	4.7	...

No interest is paid on the bonds. At the close of the year there were outstanding $284,217 in receivers' certificates, issued to pay floating debt claims, etc. Last year $32,000 were issued. There were $57,000 first and $1,036,000 second-mortgage bonds pledged for floating debt taken by the holders of that debt in payment. The car trust certificates were extended for five years, and interest reduced from 6 to 5 per cent.

Central, of New Jersey.

The following figures for the operations of this road for the year ending Nov. 30 last are taken from the report of the Philadelphia & Reading Co. The total mileage included under the Central lines is 578 miles.

The earnings for the year were as follows:

	1886.	1885.	Increase.	P c
Earnings.....	$10,690,719	$10,300,466	$390,253	3 8
Expenses.....	6,000,013	5,699,200	300,813	5.3
Net earnings.....	$4,690,706	$4,601,266	$89,440	1.9
Gross earn. per mile.	18,657	17,976	681	3.8
Net " "	8,186	8,030	156	1.9
Per cent of exps.....	56.1	55.3	0.8	....

The increase in gross earnings was less, comparatively, than that in expenses.

A comparative statement of the result of the year is as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Net earnings.....	$4,690,706	$4,601,266	I. $89,440	1.9
Fixed charges.....	4,847,000	4,826,851	I. 21,149	0 4
Deficit.....	$156,294	$224,585	D. $68,291	30.4
Dividends accrued.	1,113,793	1,113,793	.. ..	...
Total deficit.....	$1,270,086	$1,338,377	D. $68,291	5.1

In this statement are included all charges accruing under the lease, whether paid or not. The stock dividends were not paid in either year. The report gives no statement of the amount actually paid under the lease.

The Central Railroad Co. resumed possession of its lines on Jan. 1, 1887, as heretofore noted.

Pittsburgh & Lake Erie.

This company owns a line from Pittsburgh, Pa., to Youngstown, O., 68 miles, with a branch to New Castle, Pa., 29 miles, making 70.9 miles in all. The report is for the year ending Dec. 31.

The company also leases the Pittsburgh, McKeesport & Youghiogheny, from Pittsburgh to the New Haven, 57 miles, with 7.1 miles of branches; 64.1 miles in all. The earnings of that road are given separately below.

The earnings of the Pittsburgh & Lake Erie road were:

	1886.	1885.	Inc. or Dec.	P. c.
Earnings	$1,370,861	$1,201,312 I.	$169,549	14.1
Expenses.....	995,204	806,905 I.	188,299	23.3
Net earnings.....	$375,657	$394,407 D.	$18,750	4.7
Gross earn. per mile...	19,335	16,944 I.	2,391	14 1
Net " " ..	5 298	5,563 D.	265	4.7
Per cent. of exps.....	72.7	67.2 I.	5.5	....

Interest on bonds and dividend scrip and a 6 per cent. dividend on the stock amounted to $297,320, leaving a surplus of $78,337 for the year.

The earnings of the leased road were as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Earnings.....	$641,838	$587,723	I. $54,115	9.2
Expenses.....	274,796	267,453	I. 7,343	2.9
Net earnings.....	$367,042	$320,270	I. $46,772	14.6
Gross earn. per mile....	10,013	9,169	I. 844	9.2
Net " " ...	5,726	4,996	I. 730	14.6
Per cent. of expenses..	42.8	45 5	D. 2.7	....

The rental (6 per cent. on bonds and stock) amounted to $360,380, leaving a surplus of $6,662 for the lessee.

Philadelphia & Reading.

The statement of the Receivers for the fiscal year ending Nov. 30 last gives the earnings and expenses of the properties of this company as noted in detail below.

The operations of the railroad lines for the year were as follows:

	1886.	1885.	Increase.	P.c
Earnings.....	$30,527,404	$28 953,577	$1,573,827	5.4
Expenses.....	17,260,493	16,200,000	1,060,493	6.5
Net earnings.....	$13,266,911	$12,753 577	$513.334	4.0
Gross earn. per mile..	19,569	18,560	1,009	5.4
Net " " ..	8,504	8,175	329	4.0
Per cent. of exps.....	56.5	56.0	0.5	...

The earnings and expenses above include those of the Central Railroad of New Jersey; the expenses do not include any charge for interest and rentals.

The traffic of the railroad lines is given as follows:

	1886.	1885.	Inc. or Dec.	P. c
Tons coal carried...	13,124,109	12,580,594	I. 593,575	4.7
Tons merchandise....	10,659,852	8,393,743	I. 2,266,109	27.0
Passengers	25,600,760	23,531,057	I. 2,069,703	8 8
Tons coal on colliers.	524,443	553,565	D. 29,122	5.3

The ton of coal is 2,240 lbs.; the ton of merchandise, 2,000 lbs. The coal on colliers is the tonnage carried from shipping points by the company's own steam vessels.

The earnings and expenses of the Philadelphia & Reading Coal & Iron Co. for the year were as follows:

	1886.	1885.	Increase.	P.c.
Earnings	$15,846 412	$15 690,389	$156,023	1.0
Expenses.....	16,993,466	15,815,069	1,178 397	7.4
Deficit.	$1,147,054	$124,680	$1,022,374	820.0
Per cent. of expenses	107.2	100.8	6.4	.....

The receipts from the sale of coal last year were 11.5 cents per ton less than in 1885, and 27.4 cents less than in 1884.

The average price per ton obtained for coal for four years past has been:

1886.....	$1.537	1884.....	$1.811
1885.....	1.652	1883.....	1.875

The average rate per ton-mile charged for carrying coal over the railroad was last year 0.978 cent, against 1.072 cents in 1885.

The coal mined from the company's lands was as follows:

	1886.	1885.	Inc. or Dec.	P.c.
By Company.....	5,616,363	5,236,528	I. 379,835	7.2
By tenants.....	592,839	803,650	D. 210,811	26.2
Total.....	6,209,202	6,040,178	I. 169,024	2.8

The coal mined from the company's lands was 47.3 per cent. of the total tonnage carried by the railroad.

The net result for the two companies in 1886 is given by the Receivers as follows:

	Railroad Co.	Coal & Iron Co.	Total.
Net earnings	$13,266,911	*$1,147,054	$12,119,857
State tax on cap. stock.	30,653	.....	30,653
Debit bal. prof. a'd loss	62,895	.....	62,895
Rentals and interest ...	15,804,595	984,684	16,789,279
Total charges...	$15,898,143	$984,684	$16,882,827
Deficit...	$2,631,232	$2,131,738	$4,762,970

* Deficit.

In rentals and interest are included all charges accruing (whether paid or not) on funded debt and lease, and also interest on the floating debt.

The report of President Corbin, as submitted to the stockholders at the annual meeting, gives a statement varying somewhat from the Receivers' figures. It is as follows:

	Railroad Co.	Coal & Iron Co.	Total.
Earnings...	$30,517,404	$15,846 412	$46,373,816
Expenses.....	17,354.041	16,933 466	34,347,507
Net earnings.....	$13,173 363	*$1,147,054	$12,026,309
Fixed charges.....	15.804,595	984,684	16,789,279
Deficit	$2,631,232	$2,131,738	$4,762,970

* Deficit.

The apparent difference between the two statements is in the items of state tax on capital stock, $30,653, and debit balance of profit and loss, $62,895 (a total of $93,548) which are included in the Receivers' statement under charges, but in the President's figures under expenses, the final net result being, of course, the same.

The net earnings and charges of the railroad lines were divided as follows:

	Phila. & R.	N. J. Central.	Total.
Net earnings.....	$8,482,657	$4,690,706	$13,173,363
Charges.....	9,843,803	5,960,792	15,804,595
Deficit.....	$1,361,146	$1,270,086	$2,631,232

The floating debt of the two Reading companies on Nov. 30 was as follows:

	Railroad Co.	Coal & Iron Co.	Total.
Floating debt.....	$9,560,176	$1,855,362	$11,415,538
Current liabilities...	16,741,482	1,622,253	18,363,735
Total.....	$26,301,658	$3,477,615	$29,779,273

The total increase in these floating liabilities during the year was $4,709,096. Included in the floating debt are receivers' certificates and notes amounting to $3,067,284. The total amount of the debt which is secured by collaterals is $8,348,254.

No statement of the funded debt has appeared with the present report; by the balance sheets of Nov. 30, 1885, the funded debt of the Railroad Co. was $96,979,028; of the Coal & Iron Co. (excluding $39,787,966 bonds and mortgages held by the Railroad Co.), $14,380,087; a total of $111,359,115.

President Corbin's report concluded as follows: "During the year 1886 the various bodies constituted by the creditors of the Reading Co. for the purpose of devising a plan for its rehabilitation were constantly engaged. As the result of their labors a plan, which is believed by the management to be adequate and fair to all interests involved in the reorganization of the company, has been prepared and submitted for the consideration and action of the shareholders and creditors of the company. The board of management deem it in the highest degree important that, if possible, reorganization should be effected without the dangers and losses which inevitably surround a foreclosure, and they desire most earnestly to impress upon the interests involved the importance of a speedy acceptance and compliance with the terms proposed in the plan for the reorganization of the company without resort to foreclosure. If it is not accepted foreclosure and sale must necessarily follow."